MUSEUM LIBRARY SH 11 .A47

DIVISION OF FISHES
MUSEUM OF ZOOLOGY
UNIVERSITY OF MICHIGAN

COMMERCIAL FISHERIES REVIEW

RECEIVED
JUN 2 - 1948

VOL. 10, No. 3 MARCH 1948

FISH and WILDLIFE SERVICE
United States Department of the Interior
Washington, D.C.

UNITED STATES
DEPARTMENT OF THE INTERIOR
J. A. KRUG, Secretary

FISH AND WILDLIFE SERVICE
ALBERT M. DAY, Director

COMMERCIAL FISHERIES REVIEW

A REVIEW OF DEVELOPMENTS AND NEWS OF THE FISHERY INDUSTRIES
PREPARED IN THE DIVISION OF COMMERCIAL FISHERIES

A. W. Anderson, Editor
F. F. Johnson, Associate Editor
F. J. Anderson, Assistant Editor

Applications for COMMERCIAL FISHERIES REVIEW, which is mailed free to members of the fishery industries and allied interests, should be addressed to the
Director, Fish and Wildlife Service United States Department of the Interior, Washington, 25, D.C.

The contents of this publication have not been copyrighted and may be reprinted freely; however, reference to the source will be appreciated. The Service assumes no responsibility for the accuracy or material from outside sources.

CONTENTS

COVER: ALBATROSS III, FISHERIES RESEARCH VESSEL OF THE U. S. FISH AND WILDLIFE SERVICE, COMMISSIONED ON MARCH 19, AT THE BOSTON FISH PIER, BOSTON, MASS.

	PAGE
ARRIVALS OF FISHERY PRODUCTS AT SEATTLE, 1947, BY E. C. HINSDALE	1
EXPERIMENTAL FISHING FOR RED SNAPPER - PART II--THE USE OF MECHANICAL REELS, BY R. O. SMITH	6
TECHNOLOGICAL STUDIES OF THE STARFISH - PART III--VALUE OF STARFISH MEAL--PROTEIN SUPPLEMENT FOR GROWTH OF RATS AND CHICKS AND FOR EGG PRODUCTION, BY C. F. LEE	8
THE ALBATROSS III, BY WM. F. ROYCE	20
* * * * * *	
RESEARCH IN SERVICE LABORATORIES	27
TRENDS AND DEVELOPMENTS	30
ADDITIONS TO THE FLEET OF U. S. FISHING VESSELS	30
DUTY ON IMPORTS OF CERTAIN FILLETS INCREASED	30
PACIFIC HALIBUT FISHERY REGULATIONS FOR 1948	31
PURCHASES OF FISH BY DEPARTMENT OF AGRICULTURE	31
WHOLESALE AND RETAIL PRICES	31
FOREIGN	33
AFRICA	33
ICELAND	35
MAURITIUS	36
MEXICO	38
NEWFOUNDLAND	39
FEDERAL ACTIONS	48
FOOD AND DRUG ADMINISTRATION: OYSTERS--STANDARDS OF IDENTITY AND FILL OF CONTAINER	48
DEPARTMENT OF LABOR: WAGE AND HOUR ACT INTERPRETATION	49
DEPARTMENT OF STATE: PORT PRIVILEGES FOR CANADIAN VESSELS IN ALASKA	49
TARIFF COMMISSION: "ESCAPE CLAUSE" IN TRADE AGREEMENTS	50
GRAPHS	52
LANDINGS AND RECEIPTS	52
COLD STORAGE HOLDINGS AND FREEZINGS OF FISHERY PRODUCTS	53
CANNED FISHERY PRODUCTS	54
PRICES, IMPORTS, AND BY-PRODUCTS	55
RECENT FISHERY PUBLICATIONS	56

COMMERCIAL FISHERIES REVIEW

March 1948 Washington 25, D.C. Vol.10, No.3

ARRIVALS OF FISHERY PRODUCTS AT SEATTLE, 1947

By E. C. Hinsdale*

Landings and receipts of fresh and frozen fishery products at Seattle during 1947 totaled 78,064,000 pounds, valued at approximately $15,889,000. In volume, this was the third largest year since 1939 when records were first obtained. The 1947 receipts were exceeded only in 1945 and 1943 when 89,500,000 pounds and 82,500,000 pounds, respectively, were received. In value, however, 1947 exceeded the record established in 1946 when 77,400,000 pounds were received, valued at $15,319,000.

Washington and Oregon were the principal sources of supply, contributing 40,191,000 pounds, or nearly 51 percent of the total. Local receipts were nearly 16,500,000 pounds, or 29 percent, below those from the same States in 1946. Alaska was in second place supplying 23,237,000 pounds, of which 96 percent were frozen products. The third most important source was British Columbia. Imports from this Province totaled 14,483,000 pounds, about 19 percent of all receipts. California, the Gulf States, and other sources (Table 1) contributed 153,000 pounds, less than half of one percent of the total volume.

Table 1 - Receipts by Source - 1947

Source	FRESH			FROZEN		
	1947	1946	Change from 1946	1947	1946	Change from 1946
	Pounds	Pounds	Percent	Pounds	Pounds	Percent
Local[1]	40,117,000	56,140,000	- 29	74,000	451,000	-84
California	25,000	11,000	+127	-	-	-
Gulf States	82,000	74,000	+ 11	34,000	162,000	-79
Alaska	849,000	322,000	+164	22,388,000	14,632,000	+53
British Columbia	11,206,000	3,631,000	+209	3,277,000	1,928,000	+70
Other[2]	11,000	39,000	- 72	1,000	10,000	-90
Total	52,290,000	60,217,000	- 13	25,774,000	17,183,000	+50

1/Washington and Oregon.
2/New York, Mexico, and Nova Scotia.

Alaska shipments increased more than 55 percent over those for both 1946 and 1944, and, in addition, exceeded the heavy 1945 shipments by more than 750,000 pounds. Imports from British Columbia continued to rise and were nearly 161 percent over 1946 and more than three times the 1945 imports.

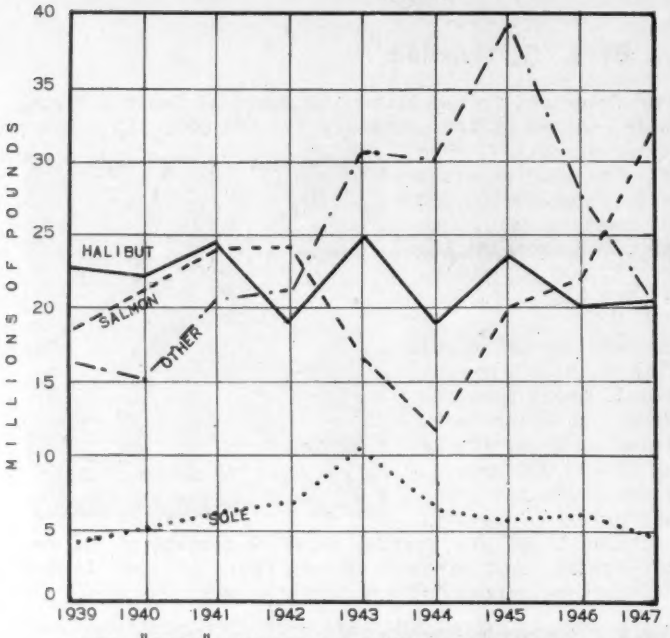
Thirty-one major classifications comprised Seattle's receipts. Of these, eight accounted for 93 percent of the total volume. Salmon (all species) led the other items with a total of 32,141,000 pounds. Second was halibut with 20,680,000 pounds, and in third place were soles totaling 4,199,000 pounds. Following these were:

* Fishery Marketing Specialist, In Charge, Fishery Market News Office, Division of Commercial Fisheries, Seattle, Washington.

	Pounds		Pounds
Rockfishes	3,847,000	Lingcod	2,531,000
Sablefish	3,699,000	Oysters	1,677,000
Livers and viscera	3,693,000		

Receipts of fresh and frozen salmon were the heaviest on record, exceeding 1942, the former peak year, by nearly 10,000,000 pounds (Figure 1). Good offshore catches of the early run chinooks and silver salmon, coupled with the relatively heavy summer catch of Puget Sound pink salmon, were largely responsible for the increase. In addition, receipts of Alaska frozen salmon were nearly double those for the previous year, and removal of the Canadian embargo on fresh salmon permitted the importation of more than 4,000,000 pounds of chum, pink, and silver salmon. State closure of certain nearby areas virtually eliminated direct landings of pink salmon at Seattle. However, nearly 4,333,000 pounds of pink salmon were trucked into Seattle from other areas of the Sound and Coast.

FIGURE 1 - VOLUME OF RECEIPTS OF CERTAIN SPECIES 1939-47



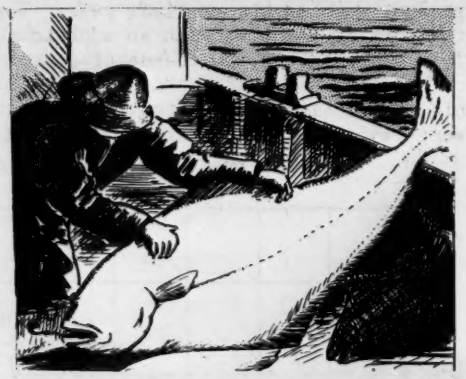
NOTE: "OTHER" INCLUDES ALL OTHER FISH, SHELLFISH, LIVERS AND VISCERA.

Receipts of chinook salmon, totaling almost 10,500,000 pounds, were nearly five times the 1946 receipts and also well above those for previous years. The seasonal runs or migrations of this species showed less tendency to fluctuate and catches were consistently heavy. The arrivals of silver salmon also were heavy and were double the volume for the previous year. Catches of silvers were somewhat erratic with the bulk being landed late in the season. The average price received by fishermen for all salmon reached an all-time high of nearly 19 cents a pound. In 1939 and 1940, this average was about 8 cents and during the war years, 1942-45, this was increased to 14 cents a pound. In a number of cases, chum salmon prices were frequently too high for canners to meet and abnormally large quantities were sold in the fresh markets. Toward the close of the season, considerable quantities of chum salmon were imported from British Columbia solely for canning.

Further indication of a satisfactory salmon season is evidenced by the pack of canned salmon. In Alaska, from May 1 to November 15, a total of 4,268,000 cases were packed. This was an increase of 388,000 cases over the 1946 pack, but the second smallest pack in Alaska since 1927. However, the canning of more than 1,333,000 cases in the Bristol Bay districts was outstanding. The pack of pink salmon did not reach expectations, and the over-all output of canned chums and silvers were somewhat under those for previous years. It is estimated that be-

tween 800,000 and 900,000 cases were packed in Puget Sound during 1947, the largest pack in this area since 1931.

The 1947 halibut fishing season opened May 1 and closed August 17, a total of 109 days, 2 less than in 1946, the previous shortest season in the history of the fishery. Seattle received nearly 20,750,000 pounds of halibut from all sources during the year, 1 percent over the 1946 receipts, but nearly 15 percent below 1941 and 1943, the two heaviest years since 1939 (Figure 1). More than half of this quantity was frozen halibut from Alaska. Imports from Canada supplied more than 3,000,000 pounds. Landings of fresh halibut by the Seattle fleet totaled 5,413,000 pounds, and fell short of original expectations. Normally, the local fleet catches about 28 percent of the Pacific Coast quota of 52,500,000 pounds. Due to a dispute between boat owners and crew over the share ratio, the Seattle vessels remained tied up from the opening date until July 2. When the dispute was settled on the latter date, the vessels departed for the Area 3 grounds, as the quota had been taken in Area 2 by June 8. As a result of the 62-day tie-up, the local fleet landed but 10 percent of the total quantity of halibut taken during the year by the combined United States and Canadian fleets. The gross receipts of the Seattle halibut fleet were reduced by over $2,000,000 by the tie-up.



Throughout the season, halibut prices showed less fluctuation than in previous years. The price level ranged from 4 to 5 cents a pound over the 1946 average, and was more than 11 cents above the 1939-41 average. Alaska and Canadian quotations followed a similar trend.

With the exception of the last quarter of 1947, otter trawling was a depressed and generally unprofitable fishery. The market demand for either round or processed bottom fish was consistently sluggish and freezer facilities frequently became overloaded. A considerable number of trawl vessels dropped out of the fishery earlier than usual and left for the more profitable tuna and shark fishing in southern waters.

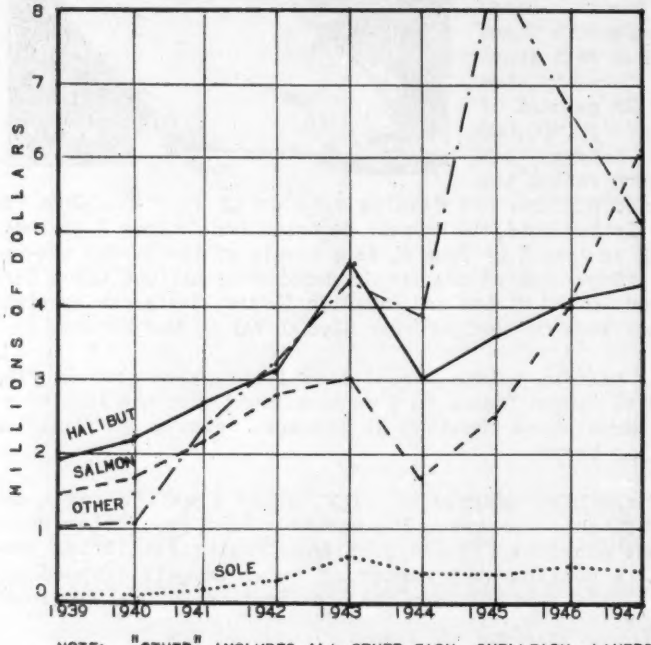
As the scarcity of meats and other protein foods became more pronounced in midyear, the demand by consumers for bottom fish increased. This occurred, unfortunately, rather late in the season and adverse weather conditions hampered the hard-working trawlers with the result that the fleet produced but a fraction of the catch needed to satisfy the new and urgent demands. During the year, 526 trawler trips were made to the offshore grounds and the vessels landed a total of 9,189,000 pounds of bottom fish. This was about half the number of trips and 6,750,000 pounds less than in 1946. The 1947 receipts were nearly 15,000,000 pounds below 1945 and were the second smallest volume for this fishery since 1939. Buyers again limited purchases of true cod and rockfishes during part of the year, but the restricted buying did not reach the serious proportions developed during 1946, and were promptly removed as poor market conditions disappeared.

Leading the trawl landings were 4,033,000 pounds of soles, mostly petrale and English. Rockfish landings were next, totaling 3,123,000 pounds, or less than

half the 1946 volume, and about one-fifth of the 1945 landings, when a peak of nearly 15,000,000 pounds for this species was reached. Most other bottom fish varieties showed similar declines.

The albacore tuna season in northern waters, while not outstanding, was more productive than the previous year. Vessels landed about 93,000 pounds direct to the port of Seattle, with an additional 148,000 pounds arriving by truck and rail. This included 129,000 pounds of albacore imported from British Columbia. The bulk of the tuna catch of Washington was landed at coastal ports where most of the canning facilities are located. State catch records indicate that 4,126,000 pounds were landed in various Washington ports and 9,174,000 pounds landed in Oregon.

FIGURE 2 - VALUE OF RECEIPTS FOR CERTAIN SPECIES 1939-47



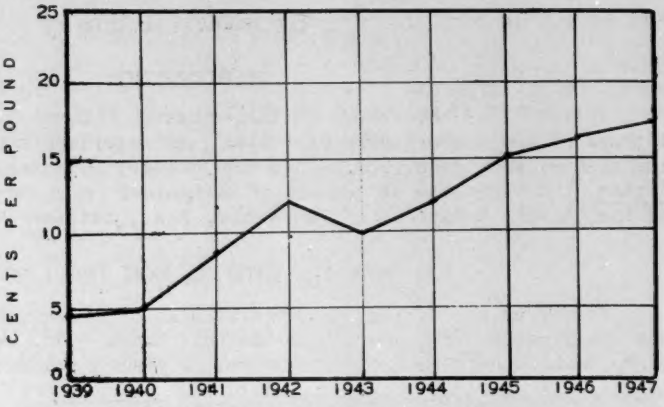
NOTE: "OTHER" INCLUDES ALL OTHER FISH, SHELLFISH, LIVERS AND VISCERA.

These landings, together with receipts of about 4,000 tons of southern-caught tuna, indicate that approximately 500,000 cases, or over twice the 1946 pack, were canned during the year. This compared favorably with the 1945 pack of 483,000 cases canned from fish taken in 1945, but was considerably below 1944, the peak year, when the catch yielded a pack of 884,000 cases. The major albacore schools were reported much further offshore during 1947 than in several previous years. Many vessels ranged seaward as much as 700 miles while few craft were able to make satisfactory catches in areas nearer than 100 miles. During the season, albacore prices ranged from $510 to $580 a ton, with a rising trend. Some sales in small lots were reported to have reached a high of $600 a ton. In 1944 and 1945, the ceiling price for albacore was $390 a ton. During 1946, this was raised to $410 a ton.

Receipts of livers and viscera totaled 3,693,000 pounds, valued at approximately $2,831,000. Almost two-thirds of this volume, or 2,267,000 pounds, were secured by the local fleet fisheries. About 75 percent consisted of grayfish (dogfish) livers, and the remainder, totaling 1,426,000 pounds, were frozen stocks from Alaska, mostly halibut livers and viscera. Liver receipts were about 20 percent below the 1946 receipts of 4,579,000 pounds and were the smallest volume received since 1940. In 1944, the peak year, nearly 6,000,000 pounds of livers and viscera were landed at Seattle. Since that time, there has been a steady decline in the receipts of livers and viscera, and accompanying this, has been a drop in value. In 1945, the average price paid for all livers and viscera was about 84½ cents a pound. This dropped to an average of 80 cents in 1946, and to 76½ cents in 1947.

The rise in value of the fishery products followed the current trend for most other food commodities and was due principally to the higher levels maintained by halibut, salmon, oysters, tuna, and a few other well known items (Figure 2). Prices for trawl fish continued at the 1946 level. The average price per pound for all species of fish and shellfish in 1947 to the fisherman was nearly 20½ cents, or about three-quarters of a cent higher than the 1946 average. From 1939 to 1941, fishermen received an average price of 8¾ cents a pound for all fish. In 1942, the average rose to 13 cents. With the exception of 1944, when OPA ceiling prices were effective on many of the higher priced varieties, the average has continued to rise each year to its present level (Figure 3).

FIGURE 3 - AVERAGE FISH PRICE PAID TO FISHERMEN 1939-47



Receipts of fish, shellfish, and livers from domestic sources (United States) totaled 63,573,000 pounds (Table 2), 11 percent below those for 1946 and nearly 22,000,000 pounds under 1945, the peak year, when domestic receipts totaled 85,512,000 pounds.

Table 2 - Receipts, Domestic and Imports, 1947-1946

Source	1947		1946	
	Pounds	Value*	Pounds	Value*
All fish, shellfish, livers and viscera:				
Domestic	63,573,000	$13,560,000	71,806,000	$14,236,000
Imports	14,491,000	2,329,000	5,594,000	1,083,000
Total	78,064,000	$15,889,000	77,400,000	$15,319,000

*Estimated.

Imports from Canada and Mexico amounted to 14,491,000 pounds, an increase of 159 percent. This was nearly 9,000,000 pounds more than last year and the heaviest ever recorded by the Seattle Market News Service since it has been in operation.

In addition to the fresh and frozen arrivals, a total of 5,153,000 pounds of cured fishery products were received at Seattle during 1947. This included 2,824,000 pounds of mild-cured salmon, 1,205,000 pounds of salted herring, 825,000 pounds of other salted fish, and 299,000 pounds of miscellaneous smoked items. This was nearly 3,000,000 pounds less than 1946, but well above the receipts of cured fish for many previous years. Herring and other fish meals from Alaska totaled nearly 14,000 tons, or about 10 percent more than last year. Over 1,500,000 gallons of fish oils (mostly herring oil) were also received.

The month having the largest volume of receipts of fishery products was October when 10,664,000 pounds arrived. This was at variance with receipts during 1946 and 1945 when the largest volume was received during July and June, respectively. Exceptionally heavy shipments of frozen fish from Alaska and British Columbia accounted for October's peak arrivals. The next heaviest month was September when 9,768,000 pounds were received, followed by July's arrivals totaling 9,100,000 pounds.

* * * * *

EXPERIMENTAL FISHING FOR RED SNAPPER

PART II-THE USE OF MECHANICAL REELS

By Robert O. Smith*

INTRODUCTION

In Part I of the report on "Experimental Fishing for Red Snapper," the present methods of the fishery were discussed, and experiments in the use of hoop nets in the fishery were described. (See the February 1948 issue of Commercial Fisheries Review.) Experiments on the use of mechanical reels were made on the sixth cruise of the vessel, Seminole, of Pensacola, Fla., between December 12 and 15, 1945.

EXPERIMENTS WITH SALMON TROLLING GURDIES

So far as can be learned, the installation of mechanical reels on the Seminole was the first to be attempted on the Gulf Coast. This reel is known as a trolling gurdy, and has been in use for a number of years by salmon fishermen of the Pacific Coast. Six of them were installed on the Seminole.

Simply defined, the gurdy is a bronze pulley, or reel, mounted on a power driven shaft, and controlled by a friction clutch to revolve with the shaft, turn freely on it, or to be stopped by a brake. Power may be supplied to the shaft by any convenient method. In this instance, it was chain driven by a 6 horsepower gasoline engine.

FIGURE 1 - SALMON GURDIES & PULLEYS

Single or stranded wire cable of appropriate size and length is wound on the reel. Hooks and sinker are attached to the free end of the cable and led over the side through a sheave mounted above and outboard of the rail. The method of installing a set of three gurdies is shown in Figure 1. Note the gear shift lever of an automobile transmission by which the speed of the shaft may be changed. Reverse is not needed as the weight of the lead sinker pulls the line off the reel.

Each gurdy is individually controlled by a lever. In neutral, the lead carries the line down until near bottom, when the brake is applied to prevent overrunning. When a bite is felt, the clutch is thrown in and the fish hauled rapidly to the surface, where the brake is again applied to avoid snatching the fish into the sheave.

Attention is called to the three sheaves above the gurdies. The center sheave suspended by a spring carries the line from the middle gurdy. When a fish bites, the spring is extended. A safety line connects sheave and pipe support to check a heavy fish. The two sheaves attached to the pipe on either side of the spring serve

*Aquatic Biologist, Division of Fishery Biology, Fish and Wildlife Service, Beaufort, S. C.

as separators to prevent fouling of the three lines. It will be noted that the cable from the left-hand gurdy passes through the left sheave, over and down through the spring loaded sheave attached to the pipe 6 feet away. The right-hand gurdy is similarly connected. In this way, one man can operate from one to three gurdies, depending on the abundance of fish. However, the limited experience of this investigation indicated that one man rarely could operate more than two gurdies, making it desirable to mount them in sets of two.

A second set of gurdies, inside the rail on the port quarter, is driven by an extension shaft from the forward set. It is not feasible to fish from both sides of the vessel on account of lines on the lee side fouling under the ship as it drifts to leeward.

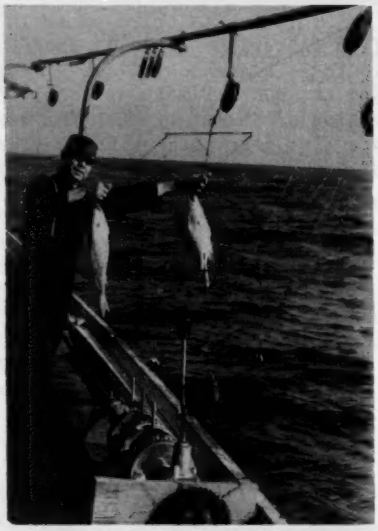


FIGURE 2 - SPREADER BARS & SNOODS

Various methods of attaching snoods to the main line were tried. The one most generally liked was the spreader bar shown in Figure 2. This is a bronze rod 3/8-inch square, and 24 inches long. Two small brass swivel snaps are attached through the center of the rod, one snap hooking into the fishing cable above, the other connecting with another cross bar below. Small swivel eyes are attached to each end of the rod, and to these is hooked a stranded wire snood 16 inches long. A cast lead weight of 7 to 10 pounds is hung from the lower cross bar. As the illustration shows, this rig has four hooks, and there is little danger of fouling when properly handled. Since each spreader is a unit which can be snapped on or off the main cable quickly, any number may be used together.

The observations presented here were made on only one trip from December 12 to 15, 1945. Since no fish were found until the afternoon of the 14th and bad weather forced a return on the morning of the 15th, the total time during which gurdies were used amounted to 4 hours and 33 minutes. Ninety-one snappers and two porgies were taken from a depth of 202 feet.

Forty-two snappers and two porgies were caught with the tandem spreaders illustrated. The nearest competitors were three spreaders which caught 17 snappers, and a single spreader with a catch of 14 snappers.

It would be helpful if direct comparison could be made between catches with gurdies and hand lines. This could not be done because none of the crew had previously operated a gurdy. As may be expected, there were numerous backlashes from reels overrunning, tangled gear in the outboard sheaves, and lost fish from improper manipulation of the clutch. At least a full day is necessary to become acquainted with the handling of the gurdy.

However, it is believed that a fisherman, experienced in using a gurdy, can catch more fish than with a hand line in depths from 30 to 50 fathoms. Fishermen usually find it difficult to hand line deeper than 50 fathoms, but with a gurdy it is practical to fish to at least 100 fathoms. Such an extension in depth is equivalent to opening up new fishing grounds.

* * * * *

TECHNOLOGICAL STUDIES OF THE STARFISH

PART III-VALUE OF STARFISH MEAL--PROTEIN SUPPLEMENT FOR GROWTH OF RATS AND CHICKS AND FOR EGG PRODUCTION

By Charles F. Lee*

INTRODUCTION

This is the third paper in a series of six technological studies of the starfish (Asterias forbesi). The first discussed its ecological relation to the oyster in Long Island Sound, the necessity for starfish control by the oyster industry, and the control methods used. The second paper reviewed data on chemical composition of the starfish. The work of Dr. W. Bergmann on the sterols of starfish was also discussed briefly. The present paper is concerned with the utilization of starfish meal in starting and laying mashes for poultry and in diets for growing rats.

REVIEW OF LITERATURE

Although efforts to exterminate starfish have been carried out by oystermen on Long Island Sound for nearly 100 years, almost no effort has been made towards the utilization of starfish so taken in these control efforts.

After the first World War, in 1919, Kole reported the utilization in Germany of starfish for feed as well as for fertilizer, but it seems to have been used chiefly to adulterate the more valuable shrimp meal. Vachon (1920) suggested that starfish might be used as a fertilizer in Canada if a sufficient supply of raw material were available, and Gibbs (1941) reported that the raw starfish which were brought in for payment of bounty in Rhode Island in 1941 were used locally by farmers and by State institutions as fertilizer.

However, it remained for the period of World War II, with its accompanying shortage of protein feeds, to cause an extensive investigation of the possible use of starfish meal in feed mixtures. In recent years, the use of commercially mixed poultry mashes and other feedstuffs has increased rapidly. Fish meals have proven of exceptional value as sources of proteins of a type not found in any vegetable source and the established fish meal industries using menhaden, herring, pilchard, and the so-called "whitefish" fillet scrap have been unable

*Chemical Engineer, Fishery Technological Laboratory, Division of Commercial Fisheries, College Park, Maryland.

NOTE: Part I of this series "Starfish Control - Its Economic Necessity and Methods Used," appeared in the January 1948 issue of Commercial Fisheries Review, pp. 1-6. Also available as Sep. No. 193.

Part II, "Chemical Composition," appeared in the February 1948 issue, pp. 11-18. Also available as Sep. No. 196.

to keep pace with the increased demand. All of these factors have accelerated the search for other sources of marine, high-protein meals for use in feeds.

There have been 6 papers published since 1944 by different groups of investigators dealing with the use of starfish meal as a protein supplement for the feeding of newly-hatched chicks. All but one of these reports presented results of work instigated by a group at the Bingham Oceanographic Laboratory which has been interested in the development of unutilized marine resources of southern New England. These reports will be briefly summarized. Bird (1944) fed poultry 3 and 6 percent starfish meal in a basal mash adjusted to maintain so far as possible the calcium:phosphorus ratio and protein content at the same levels as the control diet which contained 4 percent of fish meal. Growth was substantially equal with all three diets. The differences of 3 and 4 percent, respectively, lower mean gain in liveweight of the groups fed 3 and 6 percent starfish meal were not significant. Shank color was not bleached when the starfish meal was fed.

Heuser and McGinnis (1946) also fed to chicks diets containing 3, 6, and 12 percent starfish meal. Growth with the former diet was equal to that of the control group fed a diet containing 3 percent fish meal. There was about a 7 percent decrease in the mean gains of liveweight of the group fed the 6 percent level as compared with the control group. Chicks receiving a 12 percent level of starfish meal showed 16 percent mortality and significantly poorer growth. The gain in liveweight was only 61 percent of that of the control group. The diets contained equal quantities of protein so it was concluded that the excess calcium was responsible for the poor results obtained at the 12 percent level of starfish meal in the diet. It was concluded that the 6 percent level was the largest amount that could be fed with reasonable success.

Ringrose (1946) compared diets containing 13 and 18.5 percent levels of crude protein when fed to chicks. Mashes with the 13 percent protein content contained either 9 percent starfish meal, 4 percent rosefish meal, or 5 percent meat scrap, respectively, while those with 18.5 percent protein contained double these quantities and each diet also included 10 percent soybean oilmeal.

Growth was poor with all diets at the 13 percent level of crude protein. The diets containing starfish produced 83 percent of the gain in liveweight of that produced by the diet containing rosefish meal. With the high-protein diets, the chicks fed the 18 percent level of starfish meal averaged only one-third the gain in liveweight of the control group, and also showed a 50 percent mortality. Again the poor results are attributed by the author to the large calcium:phosphorus ratio, the high calcium content, or both.

Stuart and Hart (1946) fed chicks a diet containing starfish meal at a level of 4 percent supplemented with 4 percent meat scrap and 4.5 percent fish meal. The control group received a diet containing 7 percent fish meal and 4 percent meat scrap. Over a 12-week test period, rates of growth with the two mashes were approximately equal. Analyses of the tibia showed a higher calcium and ash content in the bones of the group which had received starfish meal than in those of the control group.

Whitson and Titus (1946) fed 3 series of chicks to make a more critical study of the quality of the protein of starfish meal. In the first series, 4 and 8 percent; in the second series, 4, 8, and 12 percent; and in the third series, 2.5 and 7.5 percent of starfish meal were included in the diets. In every case, starfish meal was the sole source of animal protein. Sardine meal was used similarly

in the various control mashes, and varying amounts of ground limestone, soybean oilmeal, and wheat were replaced by these fish meals to balance the nutrients. Growth rates of the chicks fed mashes containing the lower levels of starfish meal were as good as, or better than, those obtained with the control mashes, but the rates were lower for the groups fed the 8 and 12 percent levels of starfish meal. The mean gain in liveweight of the group fed the 12 percent level of starfish meal was only 60 percent that of the control group. It was concluded that the starfish meal could be used to supply all of the calcium and some of the animal protein, it having the same growth-stimulating qualities as sardine meal protein. The calcium content limited the amount of starfish meal which could be used.

Morse, et al, (1944) carried out their study with starfish meal with an experimental lot of about one ton of meal produced in commercial scale operations. The starfish meal was included in diets at 4 and 8 percent levels and compared with those containing a 4 percent level of crab meal and a 2.5 percent level of fish meal. The protein level and calcium:phosphorus ratio were approximately balanced. There were no significant differences in mean gains of liveweight between any of the four groups of chicks after 8 weeks. Smaller groups were continued on experiment and fed the diets containing 2.5 percent fish meal and 8 percent starfish meal until the 14th week. At this time, the two groups were still about equal in size and feathering. At this level, the starfish meal plus dicalcium phosphate adequately replaced both the fish meal and meat scrap.

Although the tests varied somewhat in detail of experiment, all of these investigators have used newly-hatched chicks. Their conclusions agree in substance; namely, that small amounts of starfish meal can replace other animal proteins as a source of supplementary protein permitting approximately equal growth on an equal-protein basis. When several levels were fed, poorer growth usually resulted when more than 6 percent starfish meal was included in the diets. It was generally concluded that this effect was due to the resultant high levels of calcium, to the unbalanced calcium:phosphorus ratio, or to both factors.

STARFISH MEAL FOR GROWTH OF RATS

The work reported herein antedates the 6 papers just discussed, having been carried out in the summer and fall of 1942. This fact is mentioned in explanation of the inclusion in these tests of certain preliminary studies exploring the possible effects of the high levels of calcium in starfish meals.

The method of preparation of the meals used in these feeding tests has been described in Part II of this series dealing with chemical composition. In brief, starfish drained of free liquid which had separated in shipping were dried in ovens heated by steam coils at about a temperature of 60° C. Most of the foreign matter was removed before drying. In the first rat and chick tests, the extracted meal referred to was that remaining after the starfish oil was extracted. A quantity of this meal was available and it was fed in amounts equivalent to the protein in the diet containing the highest level of starfish meal fed to find out whether the oil had an adverse dietary effect which had to be considered in producing feeding meals.

As a preliminary to the feeding tests, the nutritive quality of the protein was determined by a nitrogen metabolism study. Six adult male rats were fed a protein-free diet during a preliminary and following period of 10 days, and the starfish protein to be tested was then fed during a middle 4-day period according to the method of Mitchell (1924). Feces and urine were collected for each period.

A determination of the nitrogen excreted at known intake levels permitted calculation of the digestibility and biological value of the protein fed. The average value for digestibility was 76.4 percent, while the average biological value, indicative of the availability of the protein, was 83.9 percent. These values compare favorably with similar data on other types of fish meals.

In the first series of feeding tests, rats and chicks were started at the same time with similar diets. The composition of these diets is given in Table 1 (see page 12). Corn, wheat middlings, and pilchard meal levels were varied with the starfish meal so as to equalize the calculated crude protein content in all diets. The nitrogen content was later determined by the standard Kjeldahl method, the results of which agreed with the calculated values quite closely. No attempt was made in either of the test series to compensate for the high level of calcium and the highly unbalanced calcium:phosphorus ratio, since it was desired to determine the extent of the tolerance for the calcium of the starfish meal which was unavoidably included along with the more sought-after protein. The calcium and phosphorus content of the diets has been calculated (Table 1) and the calcium:phosphorus ratios for the highest levels of starfish meal fed were found to be about 24 to 1 for the diets fed to rats, and 11 to 1 for those fed to chicks.

Ten rats weighing 48 to 55 grams each, evenly divided as to sex, were used in each of the 5 groups. The tests continued for 6 weeks, and the liveweight and feed consumption of each rat were recorded weekly. The results showed that the groups receiving 12 and 24 percent starfish meal had a lower growth rate than the control group while those receiving 48 percent starfish meal and 43 percent extracted starfish meal showed a net loss of from 8 to 12 grams from the initial weight. The surprising fact is that only 4 of the 20 rats in these 2 groups died. These deaths did not occur until the 6th week, and the remaining rats, while extremely emaciated, were quite lively and showed no other gross symptoms of damage. There were no deaths for the groups fed the 12 and 24 percent levels of starfish meal, although mean gain in liveweight in these groups was only 58 and 27 percent, respectively, of that of the control group.

Early in the test, it was observed that the rats tended to sort out and leave the starfish meal. This was corrected after the second week by grinding all meals very finely in a ball mill. It is interesting to note that, at this degree of fineness, the meal was so hygroscopic that the diets caked in the feed cups. The constituent responsible for this property is not known. The caking did not seem to affect the feed consumption, which remained at a fairly even level throughout the test period.

Feces were collected from 3 rats in each group during the last 3 days on tests and analyzed for total nitrogen. The mean values for the apparent digestibility of the protein in the diet indicated by these analyses were as follows: for the control group, 86.3 percent; 12 percent starfish meal level, 80.6 percent; 24 percent starfish meal level, 80.9 percent; 48 percent starfish meal level, 79.2 percent; and for the rats fed the high level of extracted meal, 81.7 percent. This high and relatively uniform degree of digestibility at all levels would seem to indicate that the poor growth was not a result of interference with protein metabolism.

Presence of thiaminase, the thiamine destroying enzyme, had previously been demonstrated in fresh starfish, and the results of the chick growth tests indicated that some of this substance still remained in the meal. However, there was little or no improvement in either weight or condition of the rats with the addition of

Table 1 - Composition of Diets in First Series of Growth Tests

Ingredients	DIETS FOR RATS					DIETS FOR CHICKS				
	Pilchard Meal	STARFISH Meal 1	Meal 2	Meal 3	Meal 4	Pilchard Meal	STARFISH Meal 1	Meal 2	Meal 3	Meal 4
	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Ground yellow corn	63.4	55.0	46.7	30.0	35.0	33.0	27.4	21.0	8.8	13.5
Wheat bran	-	-	-	-	-	15.0	15.0	15.0	15.0	15.0
Wheat middlings	15.0	15.0	15.0	15.0	15.0	20.0	20.0	21.0	22.2	20.0
Corn gluten meal	-	-	-	-	-	5.0	5.0	5.0	5.0	5.0
Soybean oilmeal	-	-	-	-	-	5.0	5.0	5.0	5.0	5.0
Alfalfa meal	5.0	5.0	5.0	5.0	5.0	6.0	6.0	6.0	6.0	6.0
Dried skim milk	-	-	-	-	-	5.0	5.0	5.0	5.0	5.0
Pilchard meal	14.6	11.0	7.3	-	-	10.0	7.6	5.0	-	-
Starfish meal	-	12.0	24.0	48.0	-	-	8.0	16.0	32.0	-
Extracted starfish meal	-	-	-	-	43.0	-	-	-	-	29.5
Cod liver oil	2.0	2.0	2.0	2.0	2.0	1.0	1.0	1.0	1.0	1.0
Salt ($MnSO_4$ added)	-	-	-	-	-	0.03	0.03	0.03	0.03	0.03
Crude protein, calculated	20.0	20.0	20.0	20.0	20.0	23.2	23.2	23.2	23.2	23.2
Protein, (Nx6.25)	20.1	20.0	19.6	19.4	19.9	22.8	22.9	22.8	22.8	23.5
Calcium, calculated	6.1	3.12	5.63	10.7	10.4	.57	2.24	3.91	7.25	7.29
Phosphorus, calculated	.63	.59	.54	.44	.45	.78	.75	.72	.66	.66
Calcium:phosphorus ratio	0.97	5.3	10.4	24.3	23.1	0.73	3.0	5.4	11.0	11.0

Table 2 - Composition of Mashes for Second Series of Growth Tests with Chicks & For Both First & Second Series of Laying Tests

Ingredients	SECOND SERIES WITH CHICKS				LAYING TEST I		LAYING TEST II.	
	Pilchard Meal	STARFISH Meal 1	Meal 2	Meal 3	MEAL Pilchard	Starfish	MEAL Pilchard	Starfish
	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Ground yellow corn	24.0	24.4	24.1	23.8	33.0	33.0	37.5	37.5
Wheat bran	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Wheat middlings	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Ground oats	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Soybean oilmeal	24.6	24.5	24.6	24.7	10.0	10.0	12.0	12.0
Corn gluten meal	-	-	-	-	7.0	7.0	-	-
Alfalfa meal	6.0	6.0	6.0	6.0	7.0	7.0	7.0	7.0
Distiller's concentrate	3.0	3.0	3.0	3.0	2.0	2.0	2.0	2.0
Bone meal (steamed)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Ground oyster shell	5.0	3.0	1.5	-	3.7	-	4.83	-
Starfish meal	-	3.0	6.0	9.0	-	7.5	-	8.5
Pilchard meal	3.9	2.6	1.3	-	3.3	-	3.67	-
Cod liver oil	1.0	1.0	1.0	1.0	1.0	1.0	0.5	0.5
Lard	-	-	-	-	0.5	0.5	-	-
Salt	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Crude protein, calculated	21.1	21.1	21.1	21.1	18.5	18.5	17.0	17.0
Calcium, calculated	2.86	2.71	2.76	2.80	2.31	2.44	2.75	2.66
Phosphorus, calculated	.86	.85	.83	.82	.80	.77	.81	.76
Calcium:phosphorus ratio	3.3	3.2	3.3	3.4	2.9	3.2	3.4	3.5

one microgram of thiamine per gram of diet. In this series, the poor growth was apparently not due primarily to a thiamine deficiency.

The carbohydrate contents of the diets containing starfish meal were lower than that of the control diet but hardly to an extent which would account for the extremely large differences observed. In fact, the only explanation for the poor results of feeding starfish meal to rats appears to be that the rat will not tolerate the serious imbalance of the calcium:phosphorus ratio which resulted from the large excess of acid-soluble calcium contained in the starfish meal.

STARFISH MEAL FOR GROWTH OF CHICKS

It was evident from the tests with rats that this animal is not satisfactory for assaying diets containing high levels of calcium. Results obtained from a series of feeding tests with chicks were much more satisfactory and have the further advantage of being directly applicable to commercial practice. The poultry feed industry is probably the largest single user of high protein meals. Chicks and hens were therefore used in all subsequent feeding tests.

All chicks were a Rhode Island Red-New Hampshire cross, purchased from a nearby hatchery. Chicks were housed by groups in batteries in a room in which the temperature was maintained at 78°-82° F. Birds were distributed between the groups at random, although an effort was made to have initial weights of the groups about equal. Size of groups was limited to 10 chicks each by the small size and limited number of batteries available. Birds were weighed individually at weekly intervals and group feed-consumption records were kept. These data are not highly significant, since there was some wastage in scattered feed.

The same starfish meal was used for the first series of rat and chick tests and similar levels were fed. Bran, soybean oilmeal, and dried skim milk supplied additional phosphorus to reduce the calcium:phosphorus ratios materially below those of the diets containing comparable levels of starfish meal which were fed to the rats. The composition of the mashes is presented in Table 1. The crude protein was maintained at a 23.5 percent level, primarily by the adjustment in the amount of pilchard meal. Starfish meal was fed at 8, 16, and 32 percent levels. These are really abnormally high levels and were fed with the sole intention of determining the tolerance of the chick for excessive calcium content with no compensating sources of phosphorus. The amounts of calcium and phosphorus, calculated from tables of feed analyses and the calcium:phosphorus ratios are presented in this table also.

A second series of chicks was fed in the same manner as the first, with diets modified on the basis of the results obtained in the first test. In this second series, starfish meal was fed at 3, 6, and 9 percent levels in order to determine the level which permitted optimum growth. The composition of these diets is given in Table 2 (see page 12).

In the first series with chicks, the control group made rather poor growth, for reasons to be explained later. The group fed the lowest level of starfish meal is used as a basis of comparison in this case. It was difficult also to find a basis of comparison by which the two groups fed the highest levels could be included, because only one-half of these groups survived, and these would have died except for supplementary thiamine supplied after 3 weeks. These chicks made small gains in weight during the first 3 weeks, but in the third week, half of the group died. Thiamine deficiency was considered to be the probable cause of death,

since the presence of a thiamine destructive substance in raw starfish had previously been demonstrated. This will be described in detail in the next paper of this series. The diet was therefore supplemented with one microgram of thiamine per gram of diet, which resulted in a marked improvement in the condition of the chicks. Only one more death occurred, so the comparison made in Table 3 is based on the weight of the surviving chicks after 5 weeks of feeding of the supplementary thiamine.

Table 3 - Individual and Average Gains in Liveweight, and Food Consumed Per Gram for the Two Series of Growth Tests with Chicks[1]

Diet Designation	Gains in Liveweight for Individual Chicks										Average Gain in Liveweight	Food Consumed Per Gram Gain
Series I	Gms.	Gms.	Gms.	Gms.	Gms.	Gms.	Gms.	Gms.	Gms.	Gms.	Grams	Grams
Pilchard meal	182	225	325	322	203	224	449	408	152	361	285.1	3.32
8% starfish meal ...	538	373	743	383	491	713	565	663	640	*	567.3	2.66
16% " " ...	265	494	374	389	307	341	373	387	372	312	361.4	3.42
29% extracted starfish meal 1st to 3rd wks.	40	36*	38*	22*	55	35	10*	20*	29	41	40.0	5.03
Same plus thiamine 3rd to 8th wks.[2] ..	157	-	-	-	247	206	-	-	190	110	182	4.59
32% starfish meal 1st to 3rd wks. ...	12*	45	34	6*	7*	23*	43	22	38	11*	37.0	6.29
Same plus thiamine 3rd to 8th wks.[2] ..	-	97	2**	-	-	-	115	177	152	-	135.2	6.05
Series II												
Pilchard meal	970	887	903	873	739	712	696	773	807	967	832.7	3.04
3% starfish meal ...	818	662	837	743	847	859	659	707	757	*	765.4	2.89
6% " " ...	722	906	898	748	735	721	678	805	693	790	769.6	2.90
9% " " ...	604	596	547	707	666	715	613	687	752	-	654.1	2.86

*Dead. **Dead in 8 days.

1/Duration of tests is 8 weeks unless otherwise indicated.

2/100 micrograms of thiamine added per 100 grams of diet.

The data for individual gains, mean group gains in liveweight, and food consumed per gram gain in weight are shown in Table 3. It is evident that there is a large degree of individual variation in the early stages of growth of the chicks. The data on food required per gram gain in liveweight are about what may be expected for groups showing poor growth. The efficiency of utilization of food is almost invariably below normal for such groups.

In the second series of growth tests, the groups receiving 3 and 6 percent levels of starfish meal showed identical rates of growth, being 8 percent less than that of the group fed pilchard meal. The group receiving 9 percent starfish meal made only 78 percent of the gain in liveweight of the control group. A number of changes were made in the composition of the mash used in this series (Table 2). With the large reduction in maximum level of starfish meal in the diets, the amount of pilchard meal in the control mash was reduced to 3.9 percent of the diet. Soybean oilmeal in all diets was increased to compensate for the fish meal protein that was removed. The adjustments between the mashes were small so that the amount of corn could be kept almost constant in all four mashes. Ground oyster shell was added to the control and to the diets containing 3 and 6 percent starfish meal to balance, approximately, the calcium carbonate in the diet containing 9 percent starfish meal. The range of the calcium:phosphorus ratios was reduced by the addition of 2 percent bonemeal and 3 percent of a distiller's concentrate which was used instead of the dried skim milk as a source of riboflavin.

It seems certain that the poor growth of the control group in Series 1 was due to a deficiency of riboflavin. The better performance of the groups fed 8 and

16 percent starfish meal in the diets may be explained by bacterial synthesis of riboflavin, and possibly other factors, during the early stages of the drying operation in making the meal. The same effect had been noted by Lanham and Nilson (1942) in a study of the possible toxicity of artificially spoiled pilchard meal. In this case also, the diet containing the spoiled meal showed much better results than the diet containing the commercial meal. Further work identified riboflavin as one of the substances that stimulated growth which had been produced during the spoilage of the meal.

In the second series, the control group fed the pilchard meal showed very much greater growth, although they received less than half as much pilchard meal, and 2 percent less crude protein. This was the result of the adequate supply of riboflavin. The relative nutritive values of the pilchard and starfish meal proteins then may be evaluated with the proper prospective.

The sharp decrease in gain in liveweight from 92 to 78.5 percent of that of the control group, which occurred when the starfish meal in the mash was increased from 6 to 9 percent, must be explained on some other basis than as a riboflavin deficiency. The much-depended-upon explanation that the decrease is due to excess calcium or an unbalanced calcium:phosphorus ratio does not appear valid. Five percent of oyster shell was added to the control diet and lesser amounts to the others so as to give all 4 diets a practically identical calcium content. The range was only 2.71 to 2.86 percent calcium, making the range in calcium:phosphorus ratios from 3.2:1 to 3.4:1. The control group and the groups fed diets containing 3 and 6 percent starfish meal made very good growth, with a mean gain in liveweight of 833, 765, and 770 grams, respectively, at the end of 8 weeks.

The extraordinary tolerance of chicks for large amounts of calcium is also evidenced by the surviving chickens fed the high levels of starfish meal in Series 1. With mashes containing 32 percent starfish meal, the diet contained almost 18 percent calcium carbonate with no compensating source of phosphorus (calcium: phosphorus ratio of 11 to 1). Yet these chicks lived and more than doubled their weight in 5 weeks after the thiamine supplementation was started.

There are two other possible explanations for the sharply decreased rate of growth when increased amounts of starfish meal were included in the feed: either the poor quality of the protein or the presence of some other substance carried by the starfish that is detrimental, above certain levels.

All evidence indicates that the starfish protein is very nearly equal to any other marine protein supplement in biological value, when the amount used does not exceed 6 percent. It is suggested that the major factor in the interference with growth of chicks fed levels of starfish meal ranging from 6 to 18 percent, is the presence of thiaminase, the thiamine-destructive enzyme, in starfish meal which has been dried at a low temperature.

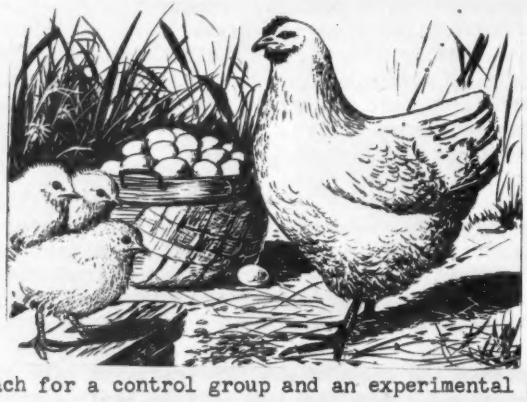
The hypothesis is advanced that the thiaminase content of the diet explains the results of the present test, as well as the similar results noted by Heuser and McGinnis (1946) who fed 6 and 12 percent levels of starfish meal, by Ringrose (1946) who fed 9 and 18 percent levels, and by Whitson and Titus (1946) who fed a 12 percent level of starfish meal. It is notable that a sun-dried meal was used by all these investigators. The one series in which a meal was fed that had been dried in commercial drying equipment (Morse, et al, 1944) resulted in better growth with the 8 percent than with the 4 percent level of starfish meal. This result was obtained with a meal containing only 27.5 percent crude protein

as compared to 30.5 and 34 percent in the sun-dried meal. This would explain why the poor results with sun-dried meals at higher levels are directly due to thiaminase which was destroyed by the heat to which the commercial meal had been subjected during drying.

It is still probable that very high levels of calcium will adversely affect the rate of growth of chicks, but this evidence indicates that as much as 12 percent of starfish meal can be included in the diet and produce good growth if the meal used is entirely free of thiaminase. Thiaminase is not a factor in the use of commercially-dried starfish meals because it is easily destroyed by heat. The probable presence of thiamine should be considered in any starfish meal dried at temperatures of less than 75° C., as it is capable of adversely affecting growth by rendering inactive considerable quantities of dietary thiamine.

STARFISH MEAL IN LAYING MASHES FOR EGG PRODUCTION

The value of starfish meal as a source of protein for growing chicks had been demonstrated, and it was thought advisable to determine its value in egg production.



Commercial laying mash feed contains added sources of lime for egg shell formation. The high calcium content of starfish meal would appear to be a desirable feature in this type of mash, rather than a source of possible trouble.

Since only limited facilities were available for egg production studies, the groups used were smaller than would be necessary to give the desired significance to differences in the results. The only available laying battery consisted of 12 units, permitting only 6 hens each for a control group and an experimental group.

In the first series of tests, one hen in each group was unproductive or died early in test, so that the final results are based on 5 hens in each group. The hens had been raised from the first series of experimental chicks, the 12 best pullets being chosen from all of the groups. They were fed a stock mash until 6½ months old. At this time all were laying. Hens from all 5 of the original experimental groups were represented, and there was no indication whatever that the retarded early growth on the high-calcium diets had any affect on the future rate of egg production. The composition of the mashes fed during the experimental period is shown in Table 2.

Starfish meal was fed the first group of hens at a 7.5 percent level, being replaced in the control mash by 3.3 percent pilchard meal, 3.7 percent ground oyster shell, and 0.5 percent lard to provide amounts of protein, calcium carbonate, and fat essentially equal in amount to the three chief nutrients of starfish meal.

The results of the first series of laying tests were checked with those of a second series of pullets raised from the chicks of the second series of growth studies. The composition of these mashes is also shown in Table 2. There were

only minor modifications in the formula. Starfish meal was increased to 8.5 percent, with pilchard meal and oyster shell in the control diet increased to 3.67 and 4.83 percent, respectively, to balance the additional starfish meal. Lard was omitted. Soybean oilmeal and corn were increased to compensate for corn gluten meal which was no longer available.

The first laying test favored the mash containing starfish meal in number and gross weight of eggs produced. The mean egg weights were almost identical for the two groups, being 52.1 grams for the group fed pilchard meal and 51.5 for the group fed starfish meal.

Those fed starfish meal laid 435 eggs while the control hens laid 379 eggs; however, one hen of the latter group did not lay for long periods so that on a productivity basis (eggs per day x 100) the groups were nearly identical, being 70.8 for the hens fed starfish meal as compared to 69.7 for the group fed pilchard

Table 4 - Egg Laying Records

Group	Wing Band Numbers	Total Eggs Laid		Total Egg Weight		Average Egg Weight		Productivity - Eggs Per Day x 100	
Series I		Number		Kilograms		Grams			
7.5% starfish meal	252	89		4.60		51.7			
	226	75		3.84		51.1			
	221	86		4.44		51.6			
	239	104		4.57		43.9			
	242	81		4.79		59.2			
Group Total		435		22.24		-			
Average		87		4.45		51.5		70.8	
3.3% pilchard meal	212	75		4.09		54.5			
	250	77		4.20		54.6			
	225	96		4.99		52.0			
	280	74		3.80		51.4			
	299	57		2.73		47.9			
Group Total		379		19.81		-			
Average		75.8		3.96		52.1		69.7	
Series II		A	B	A	B	A	B	A	B
1. Pilchard meal for period A and starfish meal for period B[1]	283	39	35	1.95	1.82	50.0	52.0		
	289	49	41	2.56	2.24	52.2	54.6		
	357	36	17	2.02	0.97	56.0	56.8		
	332	39	40	1.91	2.23	50.8	55.6		
	346	48	42	2.32	2.12	48.4	50.4		
	242	41	35	2.50	21.3	61.0	60.8		
Group Total		252	210	13.33	11.51	-	-		
Average		42.0	35.0	2.22	1.92	53.1	55.0	66.8	58.8
2. Starfish meal for period A and pilchard meal for period B	317	38	42	1.96	2.12	51.6	50.4		
	294	33	24	1.67	1.18	50.7	49.2		
	354	14	23	0.77	1.49	55.3	64.6		
	329	42	43	2.07	2.34	49.4	54.4		
	335	42	40	1.88	1.97	44.9	49.4		
	225	42	32	2.23	1.80	55.2	56.2		
Group Total		211	204	9.77	10.90	-	-		
Average		35.2	34.0	1.63	1.82	51.2	54.0	56.4	57.3

1/ The diets contained 8.5 percent starfish meal and 4.83 percent pilchard meal.

meal over a 4-month period. The individual data for these hens are summarized in Table 4. It is evident that there is a high degree of intra-group variation in both egg size and productivity, so that none of the differences is significant.

The second egg-laying test series was designed to eliminate, to a large extent, the undesirable effect of the individual variation in the hens upon the significance of the results. The design of the test was as follows:

Randomly selected groups, after laying had been well established, were fed mashes containing pilchard and starfish meals, as in Series 1, for 2 months. At the end of this period, the group that had been receiving the mash containing pilchard meal was shifted to that containing starfish meal, and vice versa. Egg records were then kept for a second 2-month period. In this way, the individual differences in egg weight and productivity characteristics of the hens in each group were made to apply to each diet for a like period. The individual records of these hens are shown in Table 4, and the results are summarized in Table 5.

Table 5 - Summary of Data for Laying Test Series II

Item	GROUP I		GROUP II	
	Feeding Period		Feeding Period	
	First	Second	First	Second
	Pilchard meal	Starfish meal	Starfish meal	Pilchard meal
Total no. eggs	252	210	211	204
Total egg weight, kg.	2.22	1.92	1.63	1.82
Average egg weight, gm.	53.1	55.0	51.2	54.0
Productivity	68.8	58.8	56.4	57.3

As was expected, there are considerable variations for both individual hens and groups. Those hens originally allotted to the group fed the pilchard meal diet produced both larger eggs and more eggs per hen than the group originally fed the starfish meal diet. After the shift at the end of 2 months, this group still produced more and larger eggs on the starfish meal diet, but the magnitude of the difference was reduced due to the slightly greater nutritive value of the pilchard meal protein. During the second period, there was a decrease for both groups in the number of eggs laid, but an appreciable increase in egg weight, both factors being related to the increased age of the hens. As a combined result of both factors, the total weight of the eggs was almost the same in both periods. Small net differences remained in favor of the group fed the diet containing pilchard meal, both as to number of eggs laid and mean egg weight. The total differences amounted to 35 eggs, and 0.9 gram per egg. The hens receiving starfish meal laid 7.7 percent fewer eggs and the eggs laid were 1.67 percent smaller than those laid by the group fed pilchard meal. The mean productivity was 57.6 for the group fed starfish meal or 7.2 percent less than that of the control group which had a productivity of 62.1.

The data indicate that pilchard meal has a slightly greater stimulating effect than starfish meal on the rate of egg production. The size of eggs laid is almost unaffected by the source of protein in the diet, this factor being apparently hereditary and little influenced by changes in diet. For practical purposes, starfish meal can be rated as a very good source of protein for laying hens, supplying, in addition, all of the calcium needed for shell formation.

CONCLUSIONS

Starfish meal has been fed to newly-hatched chicks at levels varying from 3 to 32 percent of the diet. The starfish meal is only slightly less effective when fed at the lower levels as a source of protein for growth of chicks than is a high-grade pilchard meal. Intermediate levels of starfish had a retarding effect on growth. This effect is thought to be primarily due to the presence of a thiamine-destructive enzyme in meal dried at a low temperature. The excess calcium and unbalanced ratio of calcium to phosphorus may be secondary factors affecting growth, particularly with diets containing more than 10 to 12 percent starfish meal.

Severely retarded growth resulted when chicks were fed diets containing very high levels of starfish meal. Any deaths, however, were due to thiamine deficiency, which also accounted for much of the adverse effect upon growth.

The rat is not a suitable animal for testing growth when fed diets containing much calcium. It has a relatively low tolerance for excess calcium compared with the chick.

Starfish meal compares favorably with pilchard meal as a protein supplement when used in laying mash. It also supplies calcium in place of the ground oyster shell or the limestone which is usually added. The rate of egg production of the group fed starfish meal was 7.2 percent less than for the group fed pilchard meal. This difference, however, is not statistically significant.

LITERATURE CITED

BIRD, H. R.

1944. Dehydrated pea vines and starfish meal in poultry feeds. Poul. Sci. 23, pp. 76-7.

GIBBS, H. H.

1941. Annual report of Office of Fish and Game. State of Rhode Island, pp. 11-2.

HEUSER, G. F. and McGINNIS, J.

1946. Starfish meal in chick rations. Bingham Oceanographic Coll., Bull. 9, Art. 3, pp. 10-2.

KOLE, C. J.

1919. Garnaleen en zeesterrenmeel. Pharm. Weekbl. Neder. 56: 346-51.

LANHAM, W. B. and NILSON, H. W.

1942. The effect of heat and moisture on the feeding value of pilchard meal. Fish and Wildlife Service, Res. Rep. 3, p. 10.

MITCHELL, H. H.

1924. A method for determining the biological value of protein. Jour. Biol. Chem. 58, pp. 873-903.

MORSE, R. E.; GRIFFITHS, F. P.; and PARKHURST, R. T.

1944. Preliminary report on eight weeks of comparative feeding of protein equivalent diets, containing fish meal, crab meal, and starfish meal to Rhode Island red chicks. Poul. Sci. 23: 408-12.

RINGROSE, R. C.

1946. Starfish meal feeding experiment with chicks. Bingham Oceanographic Coll., Bull. 9, Art. 3, pp. 17-20.

STUART, H. O. and HART, C. P.

1946. Starfish meal as a protein substitute in chick rations. Bingham Oceanographic Coll., Bull. 9, Art. 3, pp. 20-3.

VACHON, A.

1920. The utility of the starfish as fertilizer. Trans. Roy. Soc. Canada, 14, Sect. 5, pp. 39-49.

WHITSON, D. and TITUS, H. W.

1946. The use of starfish meal in chick diets. Bingham Oceanographic Coll., Bull. 9, Art. 3, pp. 24-7.

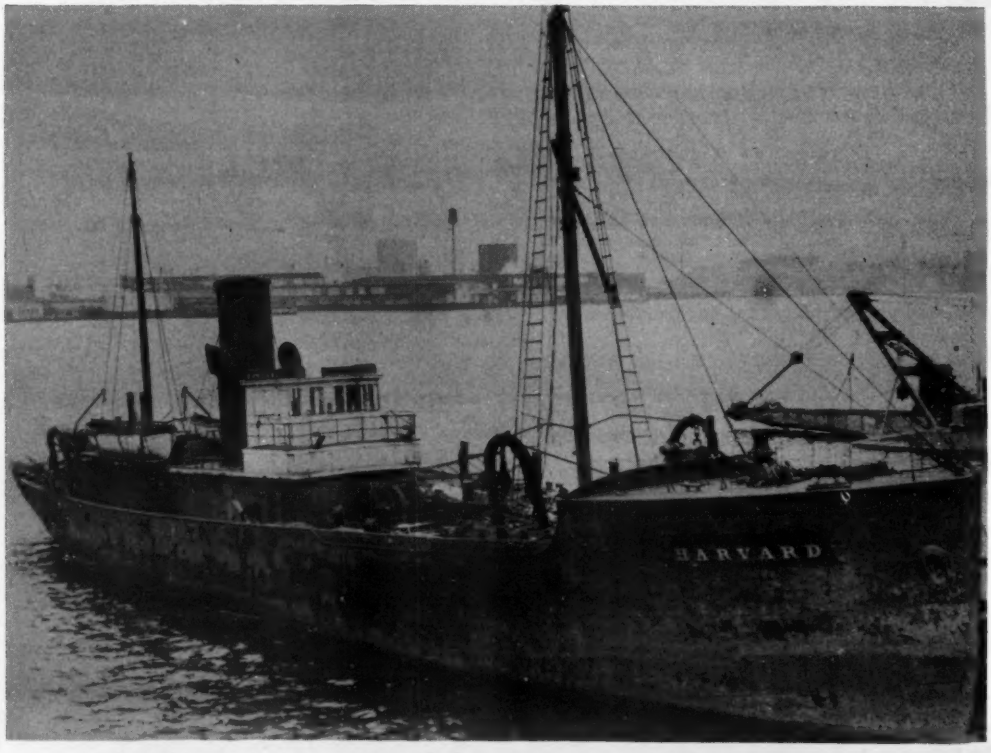
THE ALBATROSS III

By William F. Royce*

The only ocean fisheries research vessel of the United States Government, Albatross III, was dedicated on March 19, 1948, at the Boston Fish Pier, Boston, Mass. Federal and State officials and leading members of the fishing industry took part in the ceremonies.

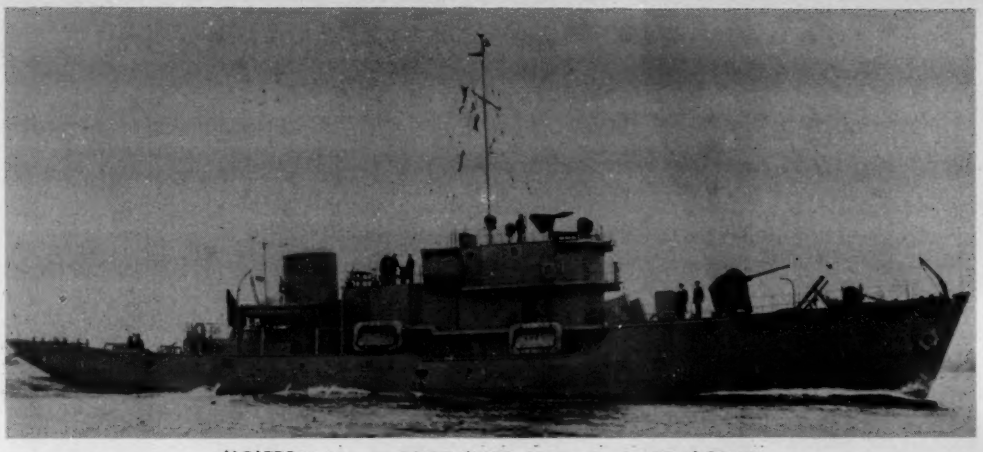
The Secretary of the Interior, J. A. Krug, speaking from the quarter-deck of the converted trawler to more than 300 people, stated:

> "The dedication of the Albatross III for fishery research in the North Atlantic is an event which justifies widespread consideration of the important problem of fishery conservation in the North Atlantic area.
>
> "While the commissioning of the Albatross III is a start towards nation-wide conservation and development of marine resources, we need similar facilities for the great Pacific Coast fisheries, the Central Pacific, for the unexplored areas of the Gulf of Mexico, and for the enclosed domestic waters of the Great Lakes."



ALBATROSS III AS THE TRAWLER HARVARD OF GENERAL SEA-FOODS CORPORATION

*Chief, New England Fishing Banks Investigations, Division of Fishery Biology, Woods Hole, Mass.



ALBATROSS III IN COAST GUARD AS C. G. C. BELLEFONTE

The vessel has been named Albatross III to carry on the traditional name of the major fishery research vessel of the United States. Albatross I was a 234-foot twin-screw, iron steamer. She was commissioned in 1882 and decommissioned in 1921. During her 39 years of fishery and oceanographic research, she visited both coasts of the United States, Alaska, South America, Central America, the Galapagos Islands, the Hawaiian Islands, Japan, the tropical Pacific islands, and the Philippine Islands. Many distinguished scientists sailed with her and their scientific work vastly increased our knowledge of the oceans. Her not-so-glorious successor, the Albatross II, was a 148-foot ex-Navy tug. She operated from 1926 to 1932 and during this time was engaged in research on the mackerel fishery, explorations of the haddock fishery grounds, and preliminary experiments with savings gear.

Acquisition of Albatross III has occupied about 14 years. In 1934, President Roosevelt authorized a fishery research vessel for the North Atlantic, but no funds were made available. Five years later, the Harvard, a steam-driven trawler, was given to the Bureau of Fisheries by the General Seafoods Corporation for the sum of one dollar. In late 1941, after about two years of planning the conversion to research and obtaining the necessary funds, the Harvard entered a shipyard and reconstruction began. War broke out and the Navy requisitioned her. She was transferred to the Coast Guard, named the C. G. C. Bellefonte and completely rebuilt as an Atlantic patrol vessel. She was reconstructed from keel to masthead and put in top condition. Plates and frames were replaced and excellent machinery installed. This conversion was completed in 1944, but as the urgent need for an Atlantic patrol vessel had passed, she was returned to the Fish and Wildlife Service. She was laid up at Woods Hole, Mass., in a semi-operating condition until the summer of 1947. During this time, the plans were redrawn to fit the changes made by the Coast Guard and funds for her reconversion to a research vessel again obtained. Last July, she entered the yards of a shipbuilding corporation and reconversion got under way.

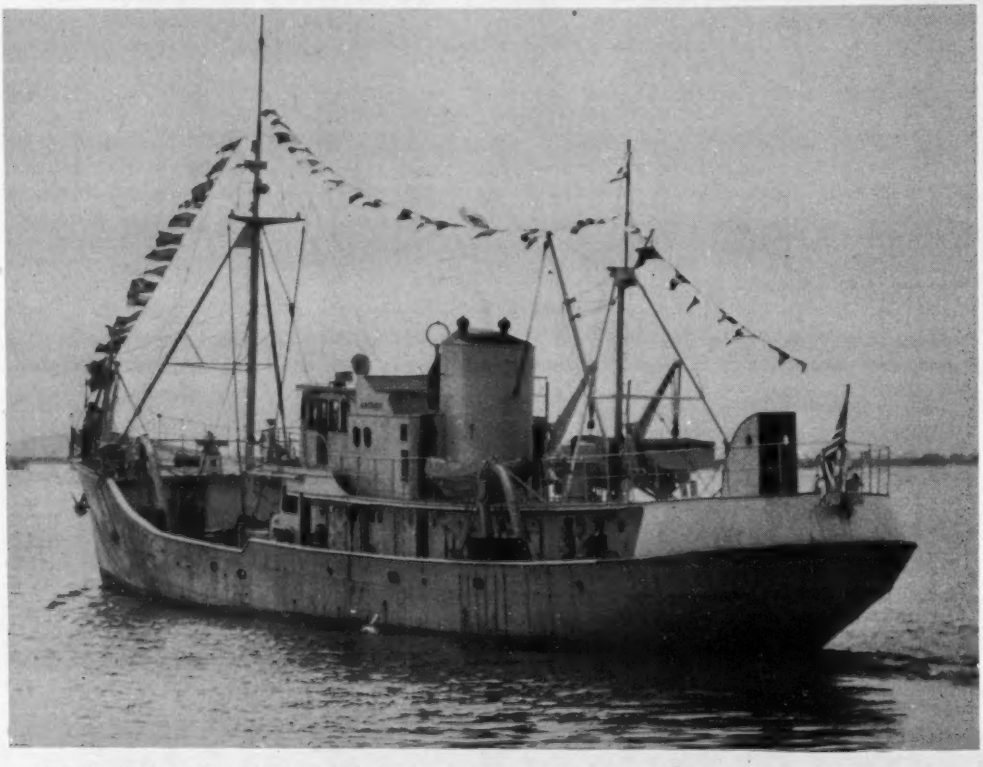
The basic lines of the Albatross III are very similar to those of the large Boston otter trawlers. She has a high head with a Maierform bow, a clear main deck about midships for the handling of fishing gear and a deck house from midships aft, housing the laboratories and officers' staterooms.

Her length overall is about 179 feet. She has a beam of about 24 feet and a draft of 12 feet. Her displacement is about 525 tons. She will be able to cruise about 4,500 miles without refueling.

She is of welded steel construction throughout. The main deck is covered with planking set in mastic. The outside bulkheads are all insulated with fiberglass. She is heated by an oil-burning furnace and a circulating hot water system. All quarters, laboratories, etc., are provided with forced-air ventilation systems.

The Albatross III is powered by a 7-cylinder, 805-horsepower diesel engine. A temporary 4-blade propeller is installed pending delivery of an adjustable pitch propeller. With this temporary propeller she cruises at about 11 knots. The electrical system is 110-volt DC; 140 kilowatts are provided by 3 diesel motor-generator sets. The engine room is fitted with a small machine shop containing a drill press, grinder, and lathe. The galley equipment includes an oil-burning range, a 12-cubic-foot refrigerator, a coffee urn, and a drinking fountain. The room used for storage of bulk galley supplies is mechanically refrigerated.

The chartroom and wheel house are fitted with the most modern navigational equipment. A partial list of the equipment follows:



THE ALBATROSS III LEAVES THE WHARF AFTER THE COMMISSIONING CEREMONIES IN BOSTON, MASS.

FIRST OFFICER JOHN COLLINS AND FISHERMEN MICHAEL SINYARD AND HUBERT POIRIER RIG A FISHING NET ON BOARD THE ALBATROSS III

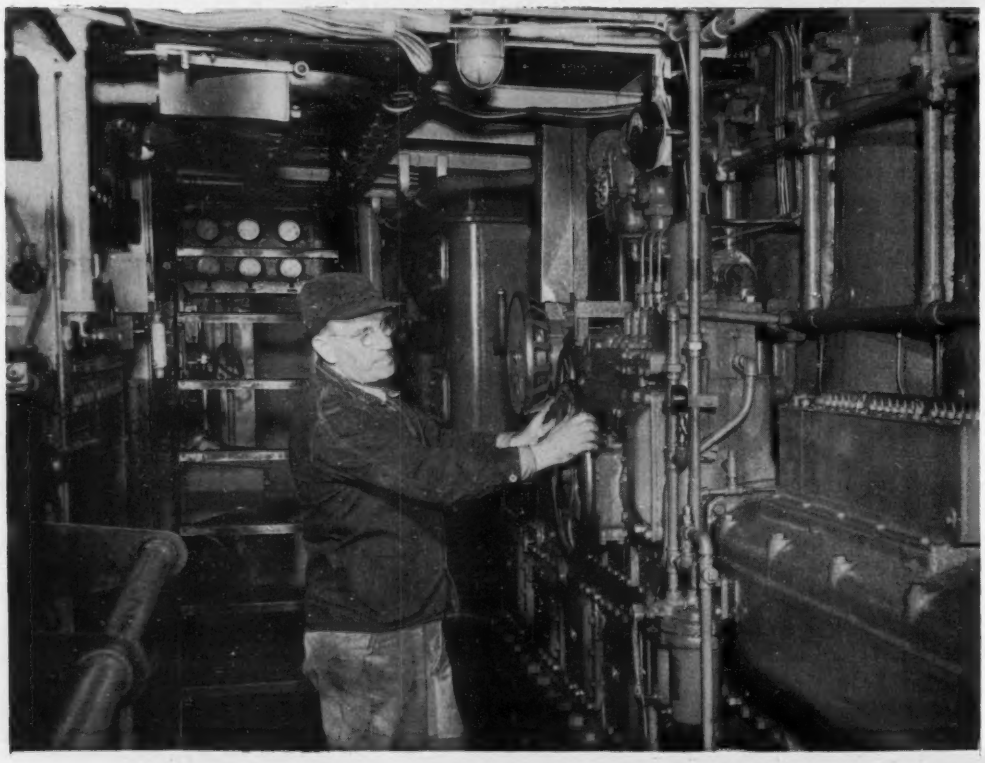
Radio-telephone, 75 watt
Sonic depth recorder
Loran receiver
Underwater recording log
Gyro compass and repeaters
Radio direction finder
Electro-telemotor steering gear
Engine room telegraph
Patent log
Magnetic compass
Chronometers
Aneroid barometer
Searchlight

The fishing equipment consists of a large electric winch with a capacity of 600 fathoms of 7/8-inch wire on each drum, which permits operation in 200 fathoms of water. The deck has been fitted out with the standard fishing arrangement of bollards and gallows frames, which will permit the use of full-size trawling nets with the speed and efficiency of the large Boston trawlers. The fish hold is necessarily small, because the space is required for other equipment and because large storage capacity is not needed. It is divided into two sections. The first is a standard hold fitted with pen boards for storing fish in ice. It has a capacity of about 50,000 pounds of fresh fish. Forward of this section are two refrigerated compartments for freezing and holding fish. The smaller room, for quick freezing, is capable of maintaining temperatures of 20° below zero. The other room will hold temperatures at about zero. The whole fish hold is insulated with sheet cork.

The laboratories are located in the main deck house just aft of the fishing winch. The wet laboratory opens onto both the port and starboard decks through Dutch doors. It is fitted with a stainless steel sink in the center, suitable for handling and examining fish. Two small sinks are located in the cabinets on the outside bulkheads. These will be used for chemical and hydrographic work. Adequate shelving, cupboard, and drawer space is provided throughout the laboratory for the storage of apparatus. The dry laboratory or library is located aft of the wet laboratory. This room is provided with a large work table, chairs, bench, and shelves. It will be used as an office for scientists for the preliminary study of the data collected at sea.

Attached to the bridge deck just outside of the wet laboratory on either side are the booms for the lowering of hydrographic apparatus. The winches for these booms are located on the bridge deck. These booms feature a traveler to which the lowering block is attached and which is used to regulate the distance of the lowering wire from the rail.

On the port side of the forecastle is the plankton room. This room will be used to facilitate the handling and lowering of plankton nets used to capture the minute animals and plants found in the water. It has a Dutch door and a working platform built into the side of the ship, which is lowered when towing nets. Di-



CHIEF ENGINEER FRANKLIN A. MACAULAY AT THE CONTROLS OF THE 800 HORSEPOWER MAIN ENGINE OF THE ALBATROSS III

CAPT. MARVIN O. RICE IN THE CHART AND INSTRUMENT ROOM OF THE ALBATROSS III

rectly over this door is the plankton boom used to make the plankton net lowerings. It also has a traveler similar to the hydrographic booms. The plankton winch is located in the trawling winch room, port side.

The living quarters provide comfortable accommodations for the ship's personnel. The Master's stateroom is located aft of the chartroom. The officers', mates', and engineers' rooms are located aft of the engine room on the main and lower decks. The scientists have four staterooms located around the wardroom on the lower deck forward of the galley and crew's mess. A stateroom for the steward and cook is located on the starboard side just forward of the crew's mess. The crew's quarters are located in the forecastle lower deck.

The operating crew of the Albatross III will consist of 21 men. These are as follows:

Master

Deck	Engine Room	Commissary
Chief Officer	Chief Engineer	Steward
Second Officer	First Assistant	Cook
Third Officer	Second Assistant	Messmen (2)
Fishermen (6)	Third Assistant	
Ordinary seamen (3)		

In addition to the above, the ship will carry 6 scientists in her normal complement. These will be a Chief Scientist, 2 Aquatic Biologists, and 3 Biological Aides. Space for 8 extra men is available. This allows for additional scien-

tists, who may be engaged on special problems, and more crew if such is necessary to efficient operation.

The Albatross III will be used to learn the facts necessary to maintain and increase the production of the fisheries of the northwest Atlantic. The research will be directed at problems of immediate and particular value to the fisheries. The problems receiving immediate attention will include:

(1) Census of the fish populations on the New England Banks.

(2) Learning the effect of otter trawling on the bottom.

(3) Improving fishing gear.

(4) Improving method of handling and preserving fish.

CAPT. MARVIN O. RICE IN THE "WET" LABORATORY OF THE ALBATROSS III

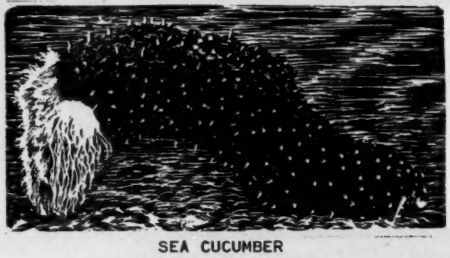
RESEARCH
IN SERVICE LABORATORIES

JANUARY 1948
Ketchikan, Alaska

Recipes for the use of canned sea cucumbers were developed and tested.

* * *

A total of 115 samples of clams were collected and extracts made for use in the clam toxicity studies.



SEA CUCUMBER

* * *

Tests were made on the storage qualities of 37 varieties of canned fishery products including the following:

- King salmon liver spread
- Smoked king salmon spread
- Chum salmon spread
- Pink salmon spread
- Hard smoked pink salmon slices in oil
- Lingcod fillets in peanut oil
- Octopus tentacle
- Minced mantle of octopus in brine
- Sea cucumbers
- Salmon eggs in brine
- Salmon egg spread
- Cannery loaf porridge
- Smoked herring in tomato sauce
- Smoked minced salmon cheeks
- Salmon milt
- Cannery loaf-green bean salad pack
- Halibut cheeks in agar
- Butter clams
- Halibut cheeks in olive oil
- Halibut cheeks in brine
- Halibut fillets in oil
- Herring spread
- Salmon backbone stock
- Sable fish fillets
- Abalone in brine
- Smoked abalone in oil
- Halibut and salmon head spread
- Fish cakes made from edible cannery trimmings
- Whole herring
- Kippered salmon collars

and eight products packed in glass:

- Cut spiced early run herring
- Small whole spiced herring
- Spiced salmon
- Pickled salmon chunks
- Spiced clams
- Kelp sweet spiced pickles
- Kelp relish
- Kelp mustard pickles

Boston, Mass.

At an informal meeting, technical personnel from local industry laboratories discussed with members of the Service's Laboratory, the bacterial flora of fish

and a suggested program of work on this subject; the use of chlorine in fish preservation in Russia; a preliminary report on antioxidant dips for frozen fish fillets; and the use of ascorbic acid in retarding rancidity in frozen mackerel.

* * *

A Fisheries Engineer from the Laboratory spent the greater part of the month in the capacity of a gear consultant in connection with the operations of a new type otter trawling and processing vessel operating in Alaskan waters.

College Park, Md.

Experimental packs of chum salmon and cod were prepared as sandwich spreads in connection with the School Lunch Program.

* * *

Analyses of the proximate composition of canned fishery products submitted for possible sale in emergency feeding programs indicated that most of the products contained only about 19 percent dry matter, and were of low calorie content due to little fat in the product.

* * *

Four samples of whiting assayed for protein content averaged about 11 percent.

* * *

A cooperative project with the U. S. Department of Agriculture--The Pilot Fish Programs--was initiated which includes the development of methods of preparing and serving the less expensive varieties of canned and frozen fish and testing their acceptability in school lunches.

* * *

Meetings of the National Canners Association at Atlantic City, N. J., January 17 to 20, were attended to assist in the cutting of canned fishery products and to discuss problems in canning technology.

Seattle, Wash.

After six months in frozen storage, examinations were made of dressed king and silver salmon which had been scaled before freezing. Surface discoloration and oil seepage were apparent on many of the silver salmon. Comparative taste tests indicated that the surface oxidation had not affected the normal color and flavor of the flesh. Although the king salmon did not discolor, deterioration of the oil in the fatty flesh and loss of flavor in the pink flesh occurred.

* * *

Frozen rockfish fillets, which had the fatty surface layer removed by a skinning machine prior to freezing, were better in color and flavor after 10 months of storage than the fillets prepared in the usual commercial manner. However, although edible, they were not of high quality.

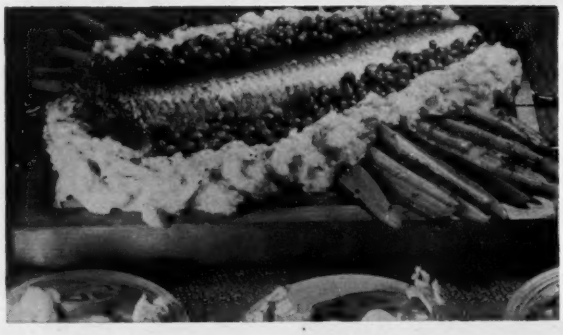
* * *

On examining king crab meat and glazed whole king crab legs stored for 20 weeks at 0° F., the best texture was found in samples frozen in one percent NaCl. The worst texture with pronounced toughening was in samples of the meat from whole crab legs frozen raw. The flavor and texture of the meat from frozen cooked crab legs was poorest in the smaller end sections exposed most to dehydration.

* * *

Analyses for cholesterol have been completed on samples of egg oil from five species of salmon. Analyses for the lecithin content of salmon egg oils are being continued. Certain of the vitamin B complex assays were begun on various salmon waste products.

PLANKED SHAD



3- or 4-pound shad, dressed
1½ teaspoons salt
1/8 teaspoon pepper
4 tablespoons butter or other fat

Seasoned mashed potatoes
Seasoned cooked vegetables (peas, carrots, cauliflower, tomatoes or onions)

If hardwood plank is used, oil well and place in a cold oven and heat thoroughly as oven preheats.

Clean, wash and dry fish. Sprinkle inside and out with salt and pepper. Brush with melted fat. Place shad on the hot oiled plank or on a greased oven glass or metal platter. Bake in a moderate oven 400° F. for 35 to 45 minutes or until fish flakes easily when tested with a fork. Remove from oven and quickly arrange a border of hot mashed potatoes around fish. Place in a preheated broiler until potatoes are slightly browned, about 5 minutes. Remove and arrange two or more hot vegetables around fish. Garnish with parsley and lemon or tomato wedges. Serve immediately on the plank. Serves 6.

Additions to the Fleet of U.S. Fishing Vessels

Forty-five vessels of 5 net tons and over received their first documents as fishing craft during January 1948, compared with 64 during the corresponding month in the previous year, according to information received from the Bureau of Customs, Treasury Department. During January, California led with 13 vessels documented, followed by Louisiana with 7, Alaska with 6, and Florida with 4.

Vessels Obtaining Their First Documents as Fishing Craft

Section	January 1948	January 1947 1/	Total 1947
	Number	Number	Number
New England	2	1	75
Middle Atlantic	-	4	70
Chesapeake Bay	1	5	97
South Atlantic and Gulf	18	30	490
Pacific Coast	16	14	411
Great Lakes	1	5	74
Alaska	6	2	47
Hawaii	1	3	23
Unknown	-	-	12
Total	45	64	1,299

1/Revised.
Note: Vessels documented by the Bureau of the Customs are craft of 5 net tons and over.

Duty on Imports of Certain Fillets Increased

In accordance with the provisions of the tariff regulations concerning the imports of cod, haddock, hake, pollock, cusk, and rosefish fillets, etc., the Bureau of Customs increased the duty on these fillets from 1-7/8 cents per pound to 2-1/2 cents per pound, effective February 16. Heavy imports of these fillets in recent weeks have made it apparent that the first quarter quota of 6,233,000 would be filled on or shortly after that date. Since the quota on groundfish, including rosefish fillets, etc., is now on a quarterly basis, imports received after April 1 will again be at the reduced tariff of 1-7/8 cents per pound until the quota for the second quarter is exhausted.

On February 6, the tariff-rate quota for the calendar year 1948 of fresh or frozen fish fillets of cod, haddock, hake, pollock, cusk, and rosefish is 24,930,188 pounds.

Pacific Halibut Fishery Regulations for 1948

The International Fisheries Commission issued on March 6, 1948, the regulations for the Pacific halibut fishery. The 1948 regulations have the following changes from the regulations of 1947:

Section 2(a). The catch limit for Area 2, which includes the waters off the coasts of Washington, British Columbia and southeastern Alaska, is increased from 24,500,000 to 25,500,000 pounds. The catch limits for Areas 3 and 4 remain the same as in 1947; namely, 28,000,000 and 500,000 pounds, respectively.

Section 9(c). The description of the nursery area off the northern coast of Graham Island has been amplified to include the waters of Masset Inlet. This was done to remove any possible doubt as to the inclusion of these waters in the closed area.

The Memorandum on the 1947 Pacific Halibut Fishery Regulations, distributed last year, will apply in its entirety to the 1948 regulations except as indicated above.

Purchases of Fish by Department of Agriculture

The United States Department of Agriculture reported 47,496 cases of canned fish purchased during January 1948, compared with 643,180 cases during January 1947. All of the purchases made during January were intended for European relief. No purchases were made by the Department in November and December 1947 and February 1948.

Purchases of Fishery Products by USDA

Commodity	Unit	January 1948		Jan. thru Feb. 1948 2/	
		Quantity	Cost 3/	Quantity	Cost 3/
FISH			Dollars		Dollars
Herring, canned 1/	Actual cases	47,145	144,264	47,145	144,264
Whiting, " 1/	" "	351	1,074	351	1,074
Total	" "	47,496	145,338	47,496	145,338

1/Actual cases contain 24-15 oz. cans.
2/No purchases during February 1948.
3/F.O.B. origin.

Wholesale and Retail Prices

This is the 11th consecutive week of increase in the Bureau of Labor Statistics' comprehensive index which is at a new postwar high of 165.5 percent of the 1926 average. It is 1.8 percent higher than a month ago, 17.5 percent above the corresponding week a year ago, and about 1 percent below the May 1920 peak.

On the average, farm products were 2.3 percent higher than a month ago and 21.4 percent higher than the corresponding week last year.

The advance of 1.4 percent in retail prices of foods brought the food index for 56 large cities combined to 209.7 percent of the 1935-39 average to establish

a new high, 14.1 percent above a year ago, 124.3 percent higher than August 1939, and 13.4 percent above the peak of June 1920. Thirty-nine of the fifty foods increased in price. Mainly responsible for the index rise was the increase of 4.5 percent for the meats, poultry, and fish group. Prices of all items in this group, except bacon and salt pork, advanced although they usually decrease at this time of year.

Wholesale and Retail Prices

Item	Unit		Percentage change from--	
Wholesale: (1926 = 100)		Jan.17,1948	Dec.20,1947	Jan.18,1947
All commodities	Index No.	165.5	+1.8	+17.5
Foods	do	181.2	+1.7	+14.8
Fish:		Jan.1948	Dec.1947	Jan.1947
Canned salmon, Seattle:				
Pink, No.1, Tall	$ per doz. cans	5.140	+3.8	+61.0
Red, No.1, Tall	do	6.372	+1.5	+18.8
Cod, cured, large shore, Gloucester, Mass.	$ per 100 lbs.	14.50	0	- 3.5
Retail: (1935-39 = 100)		Jan.15,1948	Dec.15,1947	Jan.15,1947
All foods	Index No.	209.7	+1.4	+14.1
Fish:				
Fresh and canned	do	310.9	+2.8	+14.6
Fresh and frozen	¢ per lb.	44.5	+3.7	+ 3.0
Canned pink salmon	¢ per lb. can	51.8	+1.0	+47.6

REPORTS ON GENEVA TARIFF CONCESSIONS

The schedules of tariff concessions agreed upon at the Fall 1947 Geneva Conference are being published as a supplement to *International Reference Service*. The Supplement consists of twenty separate reports, giving the schedules for individual countries.

Each report contains the country tariff numbers, a description of the products involved, the general rates of duty, the new agreement rates of duty, and the prewar imports of each product from the United States.

The reports will be issued separately between now and May 1, 1948. The countries to be covered and summary are:

AUSTRALIA	CHINA	SOUTHERN RHODESIA
BENELUX	CUBA	SYRO-LEBANESE CUSTOMS UNION
BRAZIL	CZECHOSLOVAKIA	UNION OF SOUTH AFRICA
BURMA	FRANCE	UNITED KINGDOM AND DEPENDENCIES
CANADA	INDIA AND PAKISTAN	NEWFOUNDLAND
CEYLON	NEW ZEALAND	WORLD TRADE AND TRADE WITH U.S. OF ALL
CHILE	NORWAY	SIGNATORY COUNTRIES

The reports will not be mailed automatically to subscribers of *International Reference Service*.

Persons wishing to obtain all the reports may order the series from the Superintendent of Documents, Washington 25 D.C. for an advance payment of $2.00. The individual country reports will be mentioned in the Business Service Check List as issued and may then be obtained from the Superintendent of Documents at 10 cents each.

FOREIGN

Africa

GOLD COAST FISHERY RESEARCH PROGRAM: The West Africa Fishery Research Institute, established to carry out basic and exploratory research on behalf of the four British West African Colonies of Nigeria, Gold Coast, Sierra Leone, and Gambia, expects to have a staff of three or four scientific officers; and a trawler type research vessel with two purse boats to operate between the Gambia River and the Cameroons. Sierra Leone has been chosen as headquarters.

Each of the four Colonies, however, already has an embryo Fishery Department to undertake administrative and ad hoc problems, pilot scale investigations, and getting new techniques across to the Africans after completion of the exploratory work. Nigeria has two Fishery Officers under the Department of Commerce and Industries with a supporting staff, and is giving special attention to estuarine and lagoon fisheries. In the Gold Coast, there are also two Fishery Officers under the Department of Commerce and Industries. The emphasis of present investigations is technological--a small pilot cannery for sardines (Sardinella spp.) is being operated. In Sierra Leone, a small 63-foot dragger is being operated successfully under the Department of Supplies by an experienced master fisherman, and is landing weakfish, croakers, threadfin, tongue soles, and catfish. For Gambia, a Fishery Officer is being trained in the United Kingdom, and will take up duties early in 1948.

* * * * *

SOUTH AFRICAN CRAYFISH INDUSTRY: Introduction: A report has been made by the American Consulate General, Cape Town, South Africa, on the catching and processing of the "Cape rock lobster," or crayfish (Palinurus lalandii) which has expanded in the past few years, and for which an American market for frozen crayfish tails has been developed.

TABLE MOUNTAIN IN SOUTH AFRICA

Organization of Industry: the largest factory for the canning and exporting of frozen crayfish caught in the waters around the west coast of South Africa is situated at Hout Bay, about 7 miles south of Cape Town. This factory is controlled by South African Sea Products, Hout Bay, which is an amalgamation of four companies formerly operating in and around Cape Town. The combine is backed by and affiliated with the Fisheries Development Corporation, which holds one-third of the shares in the new unified enterprise. Independent canneries are situated at Saldanha Bay, Paternoster, Stompnose Bay, Velddrift, Lamberts Bay, Thorn Bay, Hondeklip Bay, and Port Nolloth.

South African Sea Products has just built two new factories, the first near the Hout Bay harbor at a cost of $60,000 for the extraction of shark liver oil, and the second one nearby at a cost of about $240,000. The latter factory is claimed to be the most modern of its kind in the world and has a refrigeration plant with large cold storage rooms and a second plant capable of making 3 tons of ice daily. It is planned that this factory will handle up to 2,000,000 crayfish per annum direct from the fishing boats. The two factories employ, at present, some 500 people, and a new Hout Bay housing project costing $600,000 is expected to be completed in about 6 months.

It is reported that South African Sea Products plan the further erection of a fish meal factory as a result of Governmental requirements that crayfish tails may not be exported unless the exporter converts the offal into fish meal.

Production: The crayfishing season runs from about 6 to 8 months of the year. There has been a steady increase in the activity of the local fishing industry during recent years, as indicated below.

	Average prewar Annual Production	Estimated 1947 Production
	Pounds	Pounds
Annual Fish Catch (All kinds)	90,000,000	100,000,000
Production of Fish Canneries:		
Crayfish	500,000	7,000,000
Other fish	420,000	10,000,000
Fish meal	3,000,000	4,000,000
Oils:		
Fish oil	0	250,000
Vitamin oil	0	160,000
Seal oil	0	35,000

Export: As might be expected, the export of crayfish has increased proportionately to the expansion of the local fishing industry, although by Government regulation export licenses are issued only up to a maximum of 6,000,000 pounds of crayfish products. The following table shows the recent increase in crayfish exports (in pounds):

	1945	1946	1947(Estimated)
Crayfish:			
Canned	1,362,914	2,125,000	4,000,000
Tails (fresh or frozen)	377,390	2,366,166	2,000,000

While recent figures of the proportion of frozen crayfish tails exported to the United States are not available from South African Government statistics, analysis of United States Department of Commerce import statistics in conjunction with invoices certified by this office indicates these exports form a substantial proportion of the total South African production.

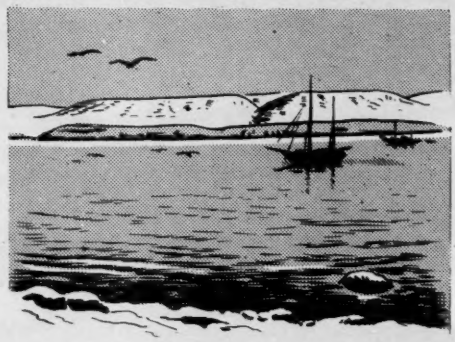
The American export market, although as yet still undeveloped, is highly valued by the industry and in order to insure that the production meets with no rejection by the American health authorities, efforts are made to have all shipments carefully examined before permits are granted. The Government has regulations in force governing freezing temperatures and hygenic methods of treatment and packing to be observed.

Conclusion: The South African crayfish industries, together with the local fishing industry as a whole, has considerably expanded in recent years. The fish-

ing industry is highly optimistic regarding its future and is not discouraged by the restrictions on the quantity of crayfish allowed to be exported annually. In particular, great value is placed on the American market for crayfish tails and further efforts towards its expansion are to be expected.

Iceland

ONE OF COUNTRIES PARTICIPATING IN EUROPEAN RECOVERY PROGRAM: A summary of the economic studies on the 16 countries which participated in the Committee of European Economic Cooperation and western Germany has been released by the Senate Committee of Foreign Relations, under the title Countries Participating in the European Recovery Program. Iceland is one of the 16 countries. The study on Iceland--which is excerpted below--was made while determining the role in European recovery of countries participating in the ERP and their need for United States assistance.



I. Effects of War on Iceland Economy: The fish industry is Iceland's chief economic activity and principal source of exports. Before the war, Iceland's fish exports went chiefly to England and other European markets, which in turn supplied the great bulk of imports. Trade with the United States was favorable to Iceland but relatively insignificant. During the war, Iceland's trade was confined almost exclusively to Great Britain and the United States, and, by the end of the war, fish and fish products constituted more than 90 percent of the Island's exports.

The foreign exchange received from fish sales during the war and the garrison expenditures of American and British troops in Iceland improved the standard of living and encouraged inflationary pressures that raised the cost of living index to 325 by October 1947 (January-March 1939 equals 100).

Since the end of hostilities and the reappearance of certain former occupied countries as fish exporters, Iceland has found difficulty in disposing of its fish in the face of prevailing world prices, which in several instances, are below Iceland's inflated production costs. The depressed state of Germany and of southern European countries deprives Iceland of important traditional markets. To meet import requirements and to proceed with its capital equipment program (principally for the fishing industry), Iceland drew heavily upon its foreign exchange reserves, with the result that they fell from a high of $89,000,000 in 1944 to a low of less than $1,000,000 by October 1947.

II. Postwar Recovery: Although Icelandic fish production capacity has been expanded, increased production is not a complete answer to Iceland's problem of postwar readjustment. Its markets continue to lie chiefly in Europe, and until Europe can supply the products needed, Iceland will continue dependent on the Western Hemisphere for essential food and other imports and thus will have a trade deficit with this area in the years immediately ahead. The Icelandic Government has taken steps to halt inflation and reduce production costs in an effort to keep fish exports at competitive price levels. A further drastic reduction in the

standard of living might bring about a temporary trade balance but would probably be followed by serious economic and political consequences.

III. Iceland's Role in European Recovery and United States Assistance: Iceland's fish products were a significant factor in Europe's prewar supply of food, particularly in Germany and the Mediterranean countries. Iceland has the equipment and manpower necessary to make an increased contribution if Western Europe itself recovers and again becomes a profitable market for Icelandic fish and edible oils.

Until this is accomplished, Iceland needs financial assistance to maintain its essential imports from the Western Hemisphere. The only alternative for Iceland would be to enter into closer trade relations with the Soviet Union and other eastern countries. Iceland's Western Hemisphere deficit for the period April 1, 1948-June 30, 1949, is estimated at 12.7 million dollars (July 1, 1947, prices). This total represents a revision downward of the requirements stated by Iceland to the CEEC, which revision was made by United States technicians after studying Icelandic needs and taking account of anticipated availabilities. Further reductions would seriously reduce the Icelandic standard of living, which, while above the near-depression prewar level of 1939, is nevertheless well below that prevailing in 1946.

Mauritius

THE FISHERIES OF THE ISLAND OF MAURITIUS, 1946:[1/] Fishing Grounds and Fishes: The Island has a coast line 152 miles long. A coral reef, sometimes of the barrier type, but generally of the fringing type, runs parallel to most of it. A lagoon, very wide in the Grand Port and in part of the Black River districts, is thus formed and covers about 95 square miles, including partly open bays and estuaries. The total shallow area where coastal fishing is exercised is approximately 125 square miles. The insular submarine shelf to the 100-fathom line is very narrow all around the Island except in the northeast and the southwest. The northeastern bank covers 150 to 200 square miles with an average depth of 25 to 35 fathoms. The southwestern bank is much smaller, only extending 3½ miles off the Morne Brabant and covering some 20 square miles. This shelf with the two banks constitutes a natural reserve of great importance for the replenishment of the lagoon.

UNICORN FISH

Though of little amplitude, the tides have an important influence on the movements of fishes and on the catch. This is also affected by the seasons, the summer season (October to May) being the more favorable time. In summer, apart from the cyclones, the weather is often calm, whereas the steady Southeast Trades blowing in winter cause rough seas on the windward side and on a large part of the leeward side of the Island.

Migratory fishes which frequent the waters in summer usually disappear with the cold season, and many of the endemic species confine themselves to greater depths.

1/From a report by the American Consulate, Mombasa, Kenya, British East Africa and based on the "1946 Annual Report of the Fisheries Branch for the Colony of Mauritius."

About 600 species of fishes exist around the Island. They may be divided into the following ecological groups:

(a) Lagoon species.
(b) Reef species.
(c) Bottom species living on the shelf up to a depth of 60 fathoms and known to local fishermen as "Fond" or "Gravier" species.
(d) Deep bottom species living on the fringe of the shelf between 60 and 120 fathoms. These are known to the fishermen as "Grand Fond" species.
(e) Pelagic species.

Fishing Methods: In the lagoon, fishing is carried on with nets, lines, and basket traps. Nets are normally forbidden in the reserved areas covering about 25 square miles. These reserves were, however, periodically fished under the control of the Fisheries Branch during the period of war emergency and food shortage. Traps are also used in shallow water outside the reef and some fishermen lay certain types of basket traps in depths of as much as 20 to 40 fathoms for unicorn fish. Outside the reef, line fishing is extensively carried on in two ways, by weighted lines for bottom fishing from drifting crafts and by trolling.

Basket trap fishing is practiced by the great majority of fishermen all around the coast. About 40 percent of them specialize in this, and lay as many as 15 traps each which they visit daily. The daily catch varies greatly according to locality, but industrious men can take as much as 15 to 17 pounds per day.

Net fishing was at one time entirely forbidden. It is practiced with cast nets and with "seine" nets. The latter must have square meshes not less than 3½ ems (1-3/8 inches) from knot to knot, they must not be longer than 500 metres (1,640 feet) and wider than 5 metres (16 feet, 5 inches).

There are, at present, 40 large net permits, the operation of which gives employment to about 250 men, or 20 percent of the total number of fishermen.

Line Fishing: Within the lagoon, the light bamboo rod and the light hand line are in use. In deep-sea fishing, strong lines are necessary, while for surface oceanic fishes, hand lines are employed, the expensive rod and line being the privilege of sportsmen. About 12 percent of the fishing community specialize in line fishing, but the majority of local fishermen practice it from time to time. It is mostly done in passes and outside the lagoon.

In the last two decades, there has been a considerable reduction in the number of skilled line fishermen, due to a variety of factors. The reduction is revealed by the decrease in the number of pinnaces of which there were 46 in 1914 (Revenue Branch figure), 33 in 1926 (Hornell) and 20 in 1945 (Fisheries Branch Census).

Catch in 1946: The total catch recorded at all controlled stations from which catch records are collected, amounted to:

	Weight in lbs.		Weight in lbs.
Nets	886,725	Octopus	676,032
Basket traps	1,329,663	Lobsters	76,579
Lines	344,482	Sharks	57,956
Sub-total	2,560,870	Sub-total	810,567
		Grand Total	3,371,437

The figures given above do not represent the total quantity of fish available for consumption. Other sources are:

1. Fish retained by the fishermen for their own consumption (estimated at 180 tons).
2. Fish caught with traps and lines and landed at uncontrolled landing stations (estimated at 200 tons).
3. Fish landed clandestinely.
4. Fish landed by sportsmen and by the hundreds of amateur fishermen, mostly sugar estate Indians who spend part of their week-ends at the sea-side fishing from the shore (estimated at 50 tons).

The total catch for the year may therefore be reasonably assessed at 2,000 tons.

Mexico

AMENDMENT TO EXPORT DUTY TARIFF: According to Diario Oficial, Mexico, D. F., dated February 9, 1948, the General Export Duty Tariff, Rule 11, was amended as follows:

RULE NUMBER 11

DETERMINATION OF THE VALUE OF MERCHANDISE FOR THE COLLECTION OF THE AD VALOREM DUTY

For the purposes of Articles 2, 4 and 5 of the Decree of November 18, 1947, which established the new General Export Duty Tariff, the following provisions shall be taken into account:

I. The customs documents covering export merchandise definitively exported, or any other operation which could assume that character, must be accompanied by a commercial invoice issued by the shipper in which the latter declares under oath that the price contained in the invoice corresponds to the price of the merchandise in the market of the place of sale, not including freight charges, insurance, or handling charges to port of exit.

When it is a question of sales abroad covered by an officially authorized or supervised contract, the price agreed upon in the contract must be indicated in the invoice.

With regard to merchandise consigned abroad on a commission basis, the merchandise shall be assigned the market price prevailing for same in the place from which the shipment is made, as indicated in paragraph I of this fraction.

II. All those operations of definitive exportation, or those operations which could assume that character, are exempted from the obligation imposed by the preceding fraction in all cases in which the interested party is not required to make the customs classification; and also in those cases concerning merchandise not subject to ad valorem duties. In the first instance, the value of the merchandise shall be fixed by the Customs inspector who makes the customs inspection, who, for this purpose, shall take into consideration price journals, sales slips, statistics or other documents which the interested party may submit, and who, lacking these, shall fix them as estimates and in accordance with precedents set on other similar operations.

When it is suspected that the value of the invoice is not the true one, the same procedure as outlined in the preceding fraction shall be followed, and if the inaccuracy is confirmed, the Customs inspector shall make a report in order to obtain the required administrative ruling.

III. The oath of accuracy of the value of the merchandise shall be made in the following form:

"I declare under oath of telling the truth that the price assigned to the merchandise covered by this invoice is that which the same has in the market of the place of sale."

TRANSITORY ARTICLE. This Decree shall go into effect on the day of its publication in the Diario Oficial.

* * * * *

FISHING SCHOOLS: Two fishing schools are to be established in Alvarado and Mazatlán, Mexico, according to an article appearing in El Nacional, Mexico, D. F., dated March 14, 1948, to train personnel necessary for the appropriate utilization of Mexico's coastal wealth. One of the schools will be installed in the port of Mazatlán, Sinaloa, where the fishery problems of the waters of the Pacific will be intensively studied; in the other institution, which will operate in the Veracruz port of Alvarado, studies will be centered around the conditions and necessities of the Gulf Coast fishery.

Among unions of maritime workers, this project has been received with enthusiasm, since it is believed that advances in the fishing industry will bring about an increase in employment and will raise the wages currently paid.

In order to stimulate attendance, the Ministry of Marine will grant a few fellowships.

Newfoundland

REVIEW OF THE 1947 FISHING SEASON: The dominant industry of Newfoundland is the cod fishery. Approximately one-third of Newfoundland's 320,000 people are directly or indirectly dependent upon the cod fishery for a living, according to the American Consulate General, St. John's, Newfoundland.

In 1947, the production of salt cod exceeded 125,000,000 pounds, compared with 110,604,256 pounds in 1946. Owing largely to foreign exchange restrictions, exports fell off from over 110,000,000 pounds in 1946 to less than 100,000,000 pounds in 1947. Relatively large stocks were carried over for marketing in 1948. In the fall of 1947, the situation with respect to the export of salt cod became highly uncertain because of sterling restrictions imposed by the United Kingdom. The Newfoundland Government eventually intervened, however, making a portion of its dollar surplus available to exporters.

For the first time since 1943, Newfoundland's production of salt cod was disposed of in the open market during 1947. Likewise in 1947, all salt cod marketing groups were merged into one association, known as the Newfoundland Associated Fish Exporters, Ltd.

The frozen fillet industry, after mushrooming during the war from an export figure of 6,500,000 pounds to over 30,000,000 pounds in 1945 and 1946, fell off sharply in 1947, exports amounting to about 12,500,000 pounds. Loss of the United Kingdom market and inability to exploit the United States market on a larger scale were the principal reasons for this steep decline.

The herring fishery likewise was on a reduced scale as compared with 1946, owing partly to a poor "strike" of herring and partly to the loss of relief contracts made during and immediately after the war.

Other subsidiary branches of the fisheries generally compared favorably with 1946.

Salt Cod Production: According to the Newfoundland Fisheries Board, preliminary figures show that salt cod production exceeded 125,000,000 pounds in the calendar year 1947, and represents the largest production of salt cod since 1935 (141,792,000 pounds).

The following table compares the production of salt cod in 1947 (estimated) with that for 1946 (final figures), in pounds:

Fishery	1946	1947
Inshore	72,713,872	82,000,000
Deep Sea	15,250,592	22,000,000
Labrador	22,639,792	21,000,000
Total	110,604,256	125,000,000

Approximately 26,200 men engaged in the cod fishery in 1947, compared with 26,162 in 1946.

The increase in production in 1947 as compared with previous years was mainly due to the successful trap fishery on the northeast coast and to the heavy landings of the deep-sea branch of the cod fishery. On the other hand, the Labrador fishery, from the standpoint of both floaters and stationers, was again extremely poor. The total landings of salt cod would doubtless have been much greater had it not been for a poor fall fishery, resulting from very stormy weather during October and November.

Exports: During 1947, exports of salt cod reached an estimated 95,813,648 pounds. This figure, even when augmented by late returns, will be well below exports for 1946 (110,331,872 pounds).

These may be broken down by countries of destination as follows:

Newfoundland's Exports of Dried Salt Cod

Country of Destination	1946 Pounds	1947 Pounds	Country of Destination	1946 Pounds	1947 Pounds
Puerto Rico	16,205,280	17,481,632	Sundry West Indies*	5,591,040	4,401,264
Portugal	18,074,448	16,812,496	Canada	310,800	4,230,464
Italy	20,524,784	12,489,008	United States	940,464	3,553,424
Jamaica	10,595,200	12,328,064	Greece	8,533,056	772,000
Spain	18,577,888	7,688,800	Other Markets	5,761,952	8,730,016
Brazil	5,216,960	7,326,480	Grand Total	110,331,872	95,813,648

*In 1947, figure pertained to French West Indies exclusively.

During and immediately after the war, the marketing of salt cod had constituted no serious problem. Fish was in short supply and was under allocation by the Combined Food Board, and latterly by the International Emergency Food Council. In 1947, such controls were removed, and difficulties were encountered in opening and holding export markets. The principal markets, however, remained essentially the same as in 1946 and the same as in most of the recent prewar years. Newfoundland's leading customers for salt cod have almost always been certain European countries bordering on the Mediterranean (e.g., Spain, Portugal, Greece, and Italy), countries in the Caribbean Sea area (e.g., Puerto Rico, Jamaica), and Brazil. In 1947, these same countries took the greater part of Newfoundland's salt cod, with the main exception being Greece. Sales to this country in 1947 were impeded largely by exchange complications.

The decline in total exports reflected increased marketing difficulties, caused largely by international exchange restrictions.

The increased difficulties in marketing were largely responsible for an accumulation of stocks of salt cod more than double the year-end figure in 1946. This is shown in the following table, giving stocks at the end of 1946 and 1947. (All figures are in pounds.)

Fishery	1946	1947
Shore	17,783,808	39,380,320
Bank	2,518,544	2,608,928
Labrador and Newfoundland Soft Cure	9,992,080	25,833,472
Total	30,294,432	67,822,720

Marketing: For the first time since 1943, Newfoundland's catch of salt cod in 1947 was disposed of in the open market. As mentioned in the previous section, from 1943 through 1946, the production of salt cod had been marketed in conformity with allocations fixed by the Combined Food Board and latterly by the International Emergency Food Council, at scheduled export prices.

A most important change took place during 1947 in Newfoundland's Marketing Administration System. Briefly, this was the merging of all salt cod marketing groups into one association, known as the Newfoundland Associated Fish Exporters, Ltd.--NAFEL. It is only through this Association that sales for export can now be made. Thus, the final step in the 10-year evolution of Newfoundland's Marketing Administration System has been taken, with the channelizing of salt cod exports through a single Association.

Prices: Prices obtained by exporters were the same as in 1946, with few exceptions. Fishermen, however, received about $1.00 per quintal (112 pounds) less than in 1946; this decrease was fairly general throughout all grades of salt cod.

The failure of exporters to pay fishermen the 1946 prices was due to marketing uncertainty which prevailed until late in the fall, when the Government intervened to facilitate exports to sterling areas. It is assumed that this Government assistance will be continued at least through 1948, and this may make possible the payment of the equivalent of 1946 prices to fishermen during the coming season.

Foreign Fishing on the Grand Banks: French and Portuguese vessels continued to be active in fishing off the Grand Banks during 1947. Such foreign fishing, of course, all but disappeared during the war, but it is now resuming its prewar importance.

French vessels enjoyed another successful season in fishing on the famous Newfoundland Grand Banks. During 1947, 15 French trawlers engaged in this fishery, compared with 10 in 1945. The catch during 1947 compared favorably with 1946 and with any prewar year.

Seven trawlers from Portugal prosecuted the fisheries off the Grand Banks in 1947, compared with 6 in 1945 and 1946. In addition, over two score smaller vessels engaged in the Grand Banks fishery, about the same number as in 1945 and 1946.

The growth of foreign fishing fleets off the Grand Banks is of immediate concern to Newfoundland. Portuguese fishing in particular has attracted wide attention, as Portugal has for centuries been one of the largest buyers of Newfoundland's salt cod. The Portuguese National Fleet is reported to have increased over 50 percent since 1941, and to have acquired larger and more modern vessels.

Frozen Cod: Marketing difficulties made the year 1947 almost disastrous for the frozen fillet branch of the cod fishery. Exports of fresh frozen fillets had mushroomed during the war years from a figure of about 6,500,000 pounds in 1940 to approximately 34,000,000 pounds in 1945. Exports dropped off slightly in 1946, and then fell off sharply to 12,490,574 pounds in 1947. Production of fillets other than cod increased, particularly in the case of haddock, but even with these added to the cod fillet figure, total exports of all fillets in 1947 amounted to 17,044,487 pounds--about half the figures for 1945 and 1946.

Fourteen quick-freezing plants operated during 1947, compared with 15 quick-freezing and 3 sharp-freezing plants in 1946--representing a capital investment of over $5,000,000. A total of only 25 filleting plants operated in 1947, compared with 45 in 1946.

The following shows exports of cod fillets from Newfoundland during 1947, with figures for 1946 in comparison (all figures in pounds):

Country of Destination	1946	1947
United Kingdom	13,118,260	300
United States	12,725,095	8,157,643
Canada*	6,809,391	4,254,746
Others	4,515	77,885
Total	32,657,261	12,490,574

*Includes chilled round cod.

While exports to the principal markets fell off sharply, those to the United Kingdom all but reached the vanishing point.

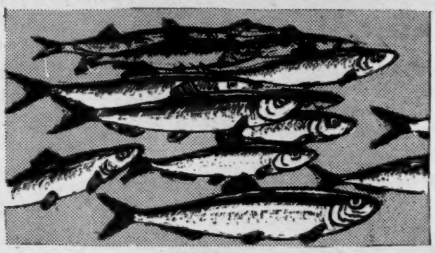
The sharp drop in production and exports was due to the loss of contracts made during the war years with the United Kingdom, and to inability to exploit the United States market on a large scale. Loss of the United Kingdom market was anticipated, but it had been hoped that exports to the United States would be maintained or even increased. In this respect, meat prices in the United States are one controlling factor--and present high prices encourage local exporters to hope for increased fillet exports to the United States in 1948.

Nevertheless, it appears clear that exports of fillets will continue for some time to come on a scale considerably reduced as compared with that of the war period. This decline in importance of the frozen fillet industry has been highly disappointing to those who had during the war held out the hope of building up the in-

dustry to a point where it might rival the salt cod fishery in value. The frozen fillet branch of the fisheries is one of the first of Newfoundland's industries to lose the export markets which the war made possible for Newfoundland (the herring fishery being another).

Herring: As was the case with frozen cod, the herring branch of the fisheries declined sharply in 1947, owing to the loss of markets previously artificially created by the war.

During the war years, the herring fishery grew to comparatively large dimensions owing principally to the exceptionally great demand for pickled herring for relief purposes by UNRRA. Thus, export figures for all types of pickled herring showed an increase from about 10,000,000 pounds in 1940 to nearly 65,000,000 pounds in 1946. Preliminary estimates of the Newfoundland Fisheries Board indicate that exports of pickled herring during 1947 will approximate 32,000,000 pounds, about one-half the 1946 figure.



HERRING

The 1946-47 fall-winter pack of Newfoundland Scotch cure herring totaled 20,082 barrels (5,020,500 pounds) as against a contracted quantity of 33,000 barrels (8,250,000 pounds). Contracts were again made early in 1947 with UNRRA for the supply of hard cured, split, pickled herring for relief purposes, amounting to 50,000 barrels (11,250,000 pounds) at 6 cents per pound, United States currency, and a second contract for 25,000 barrels at 6 cents per pound, Canadian currency. Of the total of 75,000 barrels (16,875,000 pounds) contracted with UNRRA, the equivalent of 69,548 barrels (15,648,425 pounds) was packed.

A contract for the supply of up to 4,000 barrels of Labrador Scotch cure herring was arranged by the Board, but this fishery was almost a complete failure, and only 217 barrels (54,250 pounds) were packed.

The Newfoundland Fisheries Board arranged a contract for the export of 18,000 barrels (4,500,000 pounds) of Scotch cure herring during the 1947-48 fall-winter season. It is doubtful if the full amount of this order will be packed, as the "strike" of herring was relatively poor in 1947.

As has been the case in recent years, the Fisheries Board during 1947 fixed minimum export prices for dressed and filleted herring, and also controlled the quantity to be packed by allocating individual quotas--both steps being taken in order to arrange more orderly marketing than would otherwise prevail.

The Fisheries Board has disclosed that for some time it has been endeavoring to form an association of herring packers to handle the sale and export of pickled herring, in cooperation with the Board.

Seal Fishery: In 1947, the seal fishery continued the expansion which commenced during the previous season.

Twelve vessels (including one steamer), crewed by 352 men, accounted for 34,241 seals, valued at $119,993 in 1946. This catch was more than tripled in 1947 when 3 steamers, 15 motor vessels, and 684 men accounted for 105,725 seals.

Lobsters: Exports of live lobsters during 1947 recorded an all-time high of 3,146,000 pounds, with practically the entire production being exported to the United States and Canada. This was a substantial increase over the 1946 figure of 2,581,537 pounds. A recent innovation in the export of live lobsters has been the delivery of several shipments from Newfoundland direct to the United States by air freight.

During recent years, canned lobster has accounted for only a very small percentage of the total production. During 1947, exports of canned lobster approximated 110,000 pounds compared with the 1946 figure of 193,487 pounds.

Salmon: Exports of fresh and frozen salmon during 1947 totaled approximately 2,000,000 pounds, a slight decrease from the 1946 figure of 2,126,773 pounds, and well below the average prewar annual figures. For several years prior to the war, Newfoundland's exports of fresh and frozen salmon averaged anywhere from 3,000,000 to 4,000,000 pounds annually, the principal outlet for this product being the United Kingdom. During the war years, however, the frozen salmon output suffered a severe set-back when import was prohibited by the United Kingdom Government. The prewar position has not as yet been recovered.

Canned and pickled salmon, once forming the major portion of Newfoundland's salmon exports, are now only produced on a relatively small scale. Exports of canned salmon during 1947 totaled about 52,000 pounds, compared with some 38,000 pounds in 1946. Exports of pickled salmon totaled 114,000 pounds, compared with 124,000 pounds in 1946.

Whaling: Newfoundland's whale fishery continued the expansion which began in the early war years. In 1947, 455 whales were caught and about 1,000,000 imperial gallons of whale oil produced, compared with 529 whales caught and 760,949 imperial gallons of whale oil produced in 1946. Total guano production was about 4,700,000 pounds, compared with 3,845,330 pounds in 1946.

Whaling operations in 1947 were conducted by two companies, employing 7 whaling vessels--compared with 6 vessels in 1945 and 1946.

Squid: For a period of years prior to 1945, the supplies of squid appearing on Newfoundland coasts were low. With their reappearance in coastal waters during 1945, however, the export of dried squid was resumed, but only on a comparatively small scale. Production during 1947, however, was greater than for several years past. The relatively small catch of about 2,000 barrels in 1946 has received such high prices that, as a result, when squid were found to be prevalent in 1947, fishermen brought in between 10,000 and 11,000 barrels. A considerable number of men abandoned the cod fishery in order to fish for squid.

Unfortunately, it has not as yet been possible to market this relatively large catch of dried squid. The regular Chinese market was eliminated by import regulations imposed by the Chinese Government. Between these import restrictions and exchange difficulties, the marketing of a catch five times as large as that of 1946 has presented a most difficult problem. Thus far, only very small sales have been made to a few Chinese merchants at Singapore and Bangkok, and to importers in Canada and the United States.

Fish Oils: As a result of negotiations among the Fats and Oils Committee of the International Emergency Food Council, representatives of exporters, and the Newfoundland Fisheries Board, the total 1947 production of Newfoundland fish oils--

with the exception of refined cod liver oil--was again allocated to world markets by the International Emergency Food Council.

Exports of fish oils for 1947, as compared with 1946, were as follows, in imperial gallons (1 imperial gallon equals 1.20094 U. S. gallons).

Type of Oil	1946	1947
Common Cod Oil	499,192	595,171
Refined Cod Oil	421,400	346,352
Poultry Oil	4,039	4,694
Whale Oil	621,623	961,307
Sperm Oil	56,241	51,185
Seal Oil	131,768	415,071
Herring Oil	4,785	35,249
Dogfish Oil	48	-
Rosefish Oil	-	3,921
Total	1,739,096	2,412,950

Canned Fish: In 1947, a new canning factory came into operation on the west coast. Only 7,000 cases (of 20 pounds each) have been packed in 1947-48 up to February 1, 1948, but this relatively low output has been due to: (1) an unusually poor herring fishing season, and (2) lack of trained employees.

Fish Offal: Late in 1947, a new plant went into operation to process fish offal. Production will be on a limited scale until the cod fishing season opens in spring, when it is hoped that large-scale processing will be undertaken.

Locally Built Marine Engines: The industry started in 1944 for the manufacture of small marine engines for fishermen has continued to expand. During 1947, about 45 7½-horsepower motors were shipped, bringing the total number of deliveries since the inception of the industry to 180. In addition, 175 5-horsepower motors were delivered, bringing total deliveries to 300. For the first time, work was commenced on 3½-horsepower motors, 20 being shipped during 1947. Operations are expected to expand during 1948.

PROSPECTS FOR 1948: The Salt Cod Fishery: Marketing difficulties arising largely from foreign exchange complications are expected to mar the 1948 salt cod season. At least half of Newfoundland's exports of salt cod normally go to European countries in the sterling area, and the loss of these markets would be disastrous to Newfoundland's fisheries--and would quickly transform a relatively prosperous economy into a bankrupt one.

During prewar years, when certain European countries were short of sterling, Newfoundland was able to continue exporting salt cod to them through inclusion in Trades and Payments Agreements made between the European countries concerned with the United Kingdom. In 1947, as described earlier in this report, Newfoundland could not even convert sterling into dollars, and the Government of Newfoundland had to intervene and pay dollars for equivalent sterling deposited in the Bank of England. This procedure will very likely be repeated in 1948.

However, intervention by the Government obviously cannot continue on an indefinite basis. The extent of Government aid is limited by the amount of Government surplus available in dollars, and it is by no means certain that the Government would be willing to utilize its dollar surplus up to the point of total exhaustion.

If the export problem can be solved, the salt cod fishery should be entirely successful in 1948. There are no reasons for expecting any substantial change in the volume of production, or in the number of men engaging in the fishery. Prices obtained by exporters for salt cod during 1948 are expected to approximate those prevailing in 1947.

Frozen Fillets: The outlook for the fresh frozen filleting industry is for a season about the same as in 1947. This branch of the cod fishery fell off sharply in 1947, and there appears to be no reason to anticipate any marked revival to production and export levels attained during the war years.

The United Kingdom has disappeared as a market for Newfoundland's fillets and future hopes appear to rest upon potential development of the United States market. In 1947, the United States took two-thirds of Newfoundland's total exports of 12,500,000 pounds, and this figure is almost certain to be exceeded in 1948 by perhaps a few million pounds. The leading exporting firm plans further use of airplanes for shipping a portion of the fillets to the United States market.

The Geneva Trade Agreements froze the United States duty and quota on Newfoundland fillets for three years, which will enable exporters to enter the market with more confidence than in 1947.

The rapid growth of Newfoundland's frozen fillet industry was a direct result of World War II, and had its counterpart in the fisheries of Norway, Iceland, the United States, and Canada--Newfoundland's chief competitors. Buyers (often Government agencies) were usually not too particular about price or quality because of the urgent need of food. Additionally, as the war progressed, foods, and in particular, meats, became scarce, with the result that the consumption of fish jumped rapidly to new highs. Since the war, conditions have gradually reversed themselves, and partly for this reason, the long range position of Newfoundland's frozen fish industry has become uncertain and weak.

The principal weaknesses affecting the industry may be summarized as follows:

(1) Diminishing consumption of all fish foods in the United States as meat becomes more plentiful.

(2) Efforts of Newfoundland's principal competitors to concentrate on Newfoundland's main potential market--the United States.

(3) Insufficient distributing facilities and insufficient advertising.

(4) Excessive retail prices as compared with prices of other well advertised foods.

In addition to the above external weaknesses, there are a number of purely local difficulties--some susceptible to control and others not. Among the local handicaps beyond control are:

(1) Lack of a home market of any consequence, making the industry wholly dependent upon export markets--a situation which does not apply in any competing country.

(2) Remoteness from consuming markets, necessitating large storage facilities in proportion to total production, which in turn entails high capital costs and carrying charges.

(3) Production of only one species of fish; i.e., cod fillets (United States production, as a contrasting example, is diversified by a large production of rosefish, among other species).

(4) Necessity of importing and paying transportation charges on all plant equipment and packaging material; and

(5) Insular position of Newfoundland which entails added costs of freight and insurance on products from Newfoundland to the mainland--as contrasted with position of United States, but similar to position of other competing countries.

Among the handicaps susceptible to control are:

(1) Almost entire lack of modern methods of fishing, resulting in uneconomic catches per man.

(2) Lack of centralization, which increases cost of management and general overhead charges, makes it uneconomical to operate plants for processing the offal which amounts to approximately 60 percent of landed weight.

(3) The system of cutting and trimming large quantities of fish remote from freezing plants and then hauling the fillets long distances in warm weather by ordinary trucks over rough roads, thus impairing quality; and

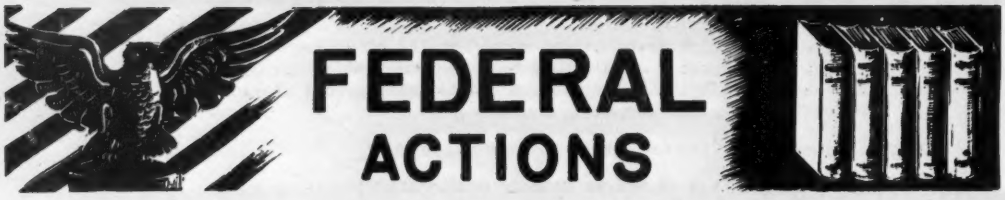
(4) Utilization of separate selling agencies in the United States by Newfoundland operators, making selling costs higher than if the selling were channelized through one agency.

Subsidiary Fisheries: It appears that the herring industry, which was greatly stimulated by UNRRA orders during and immediately after the war, will continue to contribute substantially to fishery production and exports during 1948. It is understood that, at the present time, Newfoundland representatives are negotiating with the United States Department of the Army for a contract calling for delivery of about 20,000 tons of herring. If successfully negotiated, this contract would rival in size and importance the huge UNRRA orders made during the war period.

The herring industry will also benefit by the new canning factory on the west coast, and by the dehydrating factory which produces herring oil.

The seal fishery should have another successful season in 1948. Aerial surveys will again be utilized to assist the seal fishing fleet in spotting seals and in reporting general conditions of ice.

Other branches of the fisheries are expected to approximate 1947 levels.



Food and Drug Administration

OYSTERS—STANDARDS OF IDENTITY AND FILL OF CONTAINER: An order establishing definitions and standards of identity and amending the standard of fill of container for canned oysters was signed by Oscar R. Ewing, Administrator, on March 10. Excerpts from the full text of the order as it appeared in the Federal Register of March 13 follow:

TITLE 21—FOOD AND DRUGS

Chapter I—Food and Drug Administration, Federal Security Agency

[Docket No. FDC-39]

PART 36—SHELLFISH; STANDARDS OF IDENTITY AND FILL OF CONTAINER

CANNED OYSTERS

In the matter of establishing definitions and standards of identity and amending the standard of fill of container for canned oysters.

Final order. By virtue of the authority vested in the Federal Security Administrator by the provisions of the Federal Food, Drug, and Cosmetic Act (secs. 401, 701; 52 Stat. 1046, 1055; 21 U. S. C., 341, 371), and on the basis of the evidence received at the above-entitled hearing duly held pursuant to notice issued on June 6, 1947 (12 F. R. 3726); upon consideration of the exceptions filed to the tentative order issued by the Federal Security Administrator on October 4, 1947 (12 F. R. 6699) and granting those relating to identity and denying those relating to fill of container, as may be seen by comparison of this order with the tentative order, the following order is hereby promulgated.

DEFINITIONS AND STANDARDS OF IDENTITY

Conclusion. Based on the foregoing findings of fact it is concluded that it will promote honesty and fair dealing in the interest of consumers to adopt a definition and standard of identity for canned oysters as follows:

§ 36.5 *Canned oysters; identity; label statement of optional ingredients.* (a) Canned oysters is the food prepared from one or any mixture of two or all of the forms of oysters specified in paragraph (b) of this section, and a packing medium of water, or the watery liquid draining from oysters before or during processing, or a mixture of such liquid and water. The food may be seasoned with salt. It is sealed in containers and so processed by heat as to prevent spoilage.

(b) The forms of oysters referred to in paragraph (a) of this section are prepared from oysters which have been removed from their shells and washed and which may be steamed while in the shell or steamed or blanched or both after removal therefrom, and are as follows:

(1) Whole oysters with such broken pieces of oysters as normally occur in removing oysters from their shells, washing, and packing.

(2) Pieces of oysters obtained by segregating pieces of oysters broken in shucking, washing, or packing whole oysters.

(3) Cut oysters obtained by cutting whole oysters.

(c) (1) When the form of oysters specified in paragraph (b) (1) is used, the name of the food is "Oysters" or "Cove Oysters," if of the species Ostrea virginica; "Pacific Oysters," if of the species Ostrea gigas; "Olympia Oysters," if of the species Ostrea lurida.

(2) When the form of oysters specified in paragraph (b) (2) is used, the name of the food is "Pieces of ———," the blank being filled in with the name "Oysters" or "Cove Oysters," if of the species Ostera virginica; "Pacific Oysters," if of the species Ostrea gigas; "Olympia Oysters," if of the species Ostrea lurida.

(3) When the form of oysters specified in paragraph (b) (3) is used, the name of the food is "Cut ———," the blank being filled in with the name "Oysters" or "Cove Oysters," if of the species Ostrea virginica; "Pacific Oysters," if of the species Ostrea gigas; "Olympia Oysters," if of the species Ostrea lurida.

(4) In case a mixture of two or all such forms of oysters is used, the name is a combination of the names specified in this paragraph of the forms of oysters used, arranged in order of their predominance by weight.

STANDARD OF FILL OF CONTAINER

Conclusions. It would not promote honesty and fair dealing in the interest of consumers to so reduce the requirements of the present standard of fill of container for canned oysters as to return to the fill in use prior to 1942.

It would not promote honesty and fair dealing in the interest of consumers to make separate standards of fill of container for canned oysters of different sizes or for oysters of different species.

On the basis of the evidence of record and the foregoing findings of fact it is concluded that, by using any of the heat treatments given raw oysters before packing into the can, a 6½-ounce drained weight from the No. 1 can can be obtained without impairment of the quality of canned Pacific oysters.

On the basis of the evidence of record and the foregoing findings of fact and conclusions, and taking into account the differences between commercial canning and experimental canning, it is concluded that a standard of fill of container that will promote honesty and fair dealing in the interest of consumers is a standard based on drained weight of oysters, applicable to oysters of all sizes and species in cans of various sizes, requiring that the drained weight of oysters be not less than 59 percent of the water capacity of the can.

Wherefore, it is ordered, That paragraphs (a) and (b) of § 36.6 be deleted and that there be substituted therefor a new paragraph (a) as follows:

§ 36.6 *Canned oysters; identity; label statement of optional ingredients.* (a) The standard of fill of container for canned oysters is a fill such that the drained weight of oysters taken from each container is not less than 59 percent of the water capacity of the container.

Paragraphs (c), (d), and (e) of § 36.6 are hereby designated as paragraphs (b), (c), and (d), respectively.

Effective date. The regulations and amendments hereby promulgated shall become effective on the ninetieth day following the publication of this order in the FEDERAL REGISTER.

Dated: March 10, 1948.

[SEAL] OSCAR R. EWING,
Administrator.

* * * * *

Department of Labor

WAGE AND HOUR ACT INTERPRETATION: The Administrator of the Wage and Hour Division, Department of Labor, on March 9 issued an interpretation of the Fair Labor Standards Act as it applies to the seaman and fishery exemption. It is as follows:

PART 784 - SEAFOOD AND FISHERY EXEMPTION

784.1 Enforcement policy concerning performance of non-exempt work. The Division has taken the position that the exemption provided by section 13 (a) (5) of the Fair Labor Standards Act will be deemed applicable even though some non-exempt work (that is, work of a nature other than that which characterizes the exemption) is performed by the employee during the workweek, unless the amount of such non-exempt work is substantial. For enforcement purposes, the amount of non-exempt work will be considered substantial if it occupies more than 20 percent of the time worked by the employee during the workweek.

Department of State

PORT PRIVILEGES FOR CANADIAN VESSELS IN ALASKA: The Department of State announced on February 27 that the Canadian Government has requested the resumption of port privileges granted to Canadian halibut fishing vessels in Alaskan ports of entry during the war, and the Department of State is now considering the advisability of their temporary resumption for the year 1948. Under the peacetime navigation laws, foreign fishing vessels are permitted to enter ports of the United States only when in distress or to secure supplies, repairs, or equipment. From 1942 through 1946, under the authority of the Second War Powers Act, the Secretary of the Treasury, upon the recommendation of the Secretaries of State and Interior, waived the navigation laws to the extent necessary to permit Canadian halibut fishing vessels to enter Alaskan ports of entry to land their catch upon compliance with the applicable Customs regulations. The privilege to land the catch carried with it certain corollary privileges such as the sale and transshipment in bond of the catch.

With the expiration of the Second War Powers Act on March 31, 1947, the authority to grant these privileges to Canadian fishermen lapsed. Canada has, however, continued to grant privileges to American fishing vessels by annual Orders in Council. American halibut fishing vessels may, for example, enter Canadian Pacific ports of entry not only to secure supplies, repairs, or equipment, but also to ship crews, sell the catch subject to duty, or transship it in bond. The present request on the part of Canada asks that similar privileges be granted to Canadian halibut fishing vessels in Alaskan ports.

Special legislation will be required if the Alaskan port privileges are again to be granted. The Department of State, in collaboration with the Treasury Department and the Department of the Interior, is now formulating its position with regard to the necessary legislation.

Tariff Commission

"ESCAPE CLAUSE" IN TRADE AGREEMENTS: On July 25, 1947, the Committee on Ways and Means adopted a Resolution containing, inter alia, the following paragraph:

> "Resolved that the Tariff Commission is requested to establish as soon as practicable the substantive and procedural criteria, measurements, or other standards by which it will determine whether imports, of any particular commodity are entering in such quantities as to 'injure' or threaten 'injury' to any domestic unit of agriculture, labor, industry or segment thereof, and to inform the Committee on Ways and Means as to how that Commission intends to comply with the provisions of Executive Order 9832 issued February 25, 1947 * * *."

The Tariff Commission, in a memorandum entitled Procedure and Criteria with Respect to the Administration of the "Escape Clause" in Trade Agreements, undertakes to set forth the general procedure which the Commission will follow in carrying out its obligations regarding the escape clause under Executive Order 9832, and, so far as practicable at this time, to indicate the major considerations which it will take into account in determining whether, as a result of unforeseen developments and of a concession granted by the United States on any article in a trade agreement, the article is being imported in such increased quantities and under such conditions as to cause, or threaten, serious injury to domestic producers.

The relevant portions of Executive Order 9832 for present purposes are contained in paragraphs 1-3, inclusive, of Part I, as follows:

> 1. There shall be included in every trade agreement hereafter entered into under the authority of said act of June 12, 1934, as amended, a clause providing in effect that if, as a result of unforeseen developments and of the concession granted by the United States on any article in the trade agreement, such article is being imported in such increased quantities and under such conditions as to cause, or threaten, serious injury to domestic producers of like or similar articles, the United States shall be free to withdraw the concession, in whole or in part, or to modify it, to the extent and for such time as may be necessary to prevent such injury.
>
> 2. The United States Tariff Commission, upon the request of the President, upon its own motion, or upon application of any interested party when in the judgment of the Tariff Commission there is good and sufficient reason therefor, shall make an investigation to determine whether, as a result of unforeseen developments and of the concession granted on any article by the United States in a trade agreement containing such a clause, such article is being imported in such increased quantities and under such conditions as to cause or threaten serious injury to domestic producers of like or similar articles. Should the Tariff Commission find, as a result of its investigation, that such injury is being caused or threatened, the Tariff Commission shall recommend to the President, for his consideration in the light of the public interest, the withdrawal of the concession, in whole or in part, or the modification of the concession, to the extent and for such time as the Tariff Commission finds would be necessary to prevent such injury.
>
> 3. In the course of any investigation under the preceding paragraph, the Tariff Commission shall hold public hearings,

> giving reasonable public notice thereof, and shall afford reasonable opportunity for parties interested to be present, to produce evidence and to be heard at such hearings. The procedure and rules and regulations for such investigations and hearings shall from time to time be prescribed by the Tariff Commission.

An escape clause under which emergency action withdrawing or modifying a concession may be taken is included in the multi-lateral trade agreement recently negotiated at Geneva, which covers a large part of our total import trade both in number of articles and in aggregate value. A similar clause will also be included in subsequent trade agreements. But it is not included in any of the trade agreements which were concluded prior to the Geneva Agreement, except the agreements with Mexico and Paraguay, which are still in effect.

The first paragraph of Article XIX of the General Agreement on Tariffs and Trade negotiated at Geneva is an escape clause meeting the requirements of the President's Executive Order 9832. The language of this paragraph, which is, of course, controlling so far as action under the Geneva Agreement is concerned, is as follows:

> 1.(a) If, as a result of unforeseen developments and of the effect of the obligations incurred by a contracting party under this Agreement, including tariff concessions, any product is being imported into the territory of that contracting party in such increased quantities and under such conditions as to cause or threaten serious injury to domestic producers in that territory of like or directly competitive products, the contracting party shall be free, in respect of such product, and to the extent and for such time as may be necessary to prevent or remedy such injury, to suspend the obligation in whole or in part or to withdraw or modify the concession.

The Geneva Agreement contains detailed provisions regarding the procedure to be followed in making use of the escape clause. These are quoted in full in the appendix to this report. In substance the Article requires consultation with the other contracting parties before taking action under the escape clause; under critical circumstances, however, action may be taken without prior consultation provided consultation is effected immediately thereafter. Even if agreement among the interested parties is not reached, the country proposing to take action under the escape clause may nevertheless do so. Other affected contracting countries are then free to suspend substantially equivalent obligations, so far as concerns trade with the country taking the action.

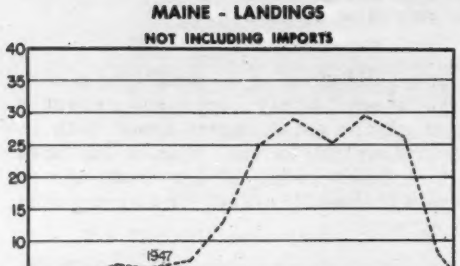
The memorandum also contains a detailed account of the "Procedure Regarding Investigations" and "Criteria for Determinations under the Escape Clause."

Copies of the complete report may be obtained, from the U. S. Tariff Commission, Washington 25, D. C.

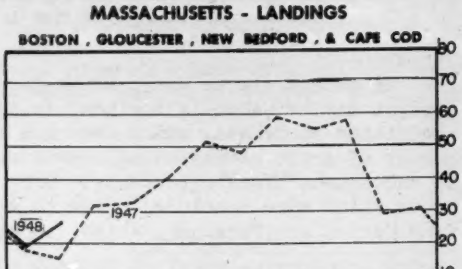
LANDINGS AND RECEIPTS

In Millions of Pounds

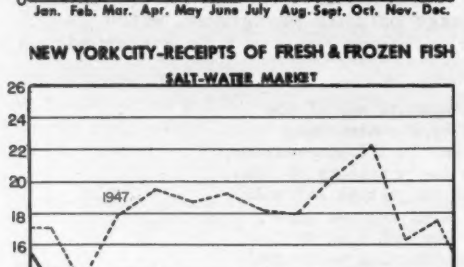
MAINE - LANDINGS
NOT INCLUDING IMPORTS



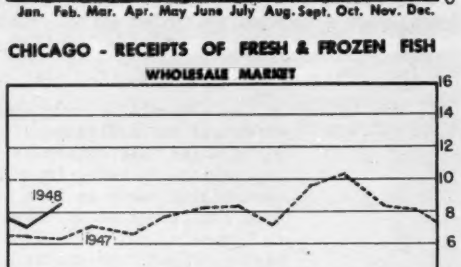
MASSACHUSETTS - LANDINGS
BOSTON , GLOUCESTER , NEW BEDFORD , & CAPE COD



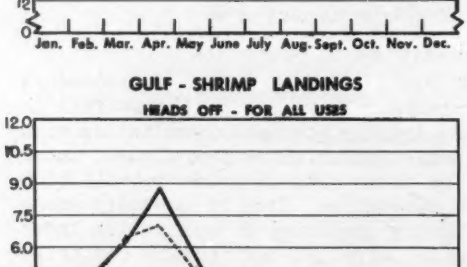
NEW YORK CITY-RECEIPTS OF FRESH & FROZEN FISH
SALT-WATER MARKET



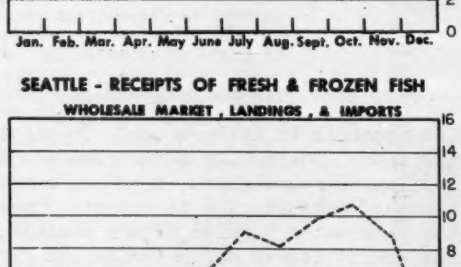
CHICAGO - RECEIPTS OF FRESH & FROZEN FISH
WHOLESALE MARKET



GULF - SHRIMP LANDINGS
HEADS OFF - FOR ALL USES

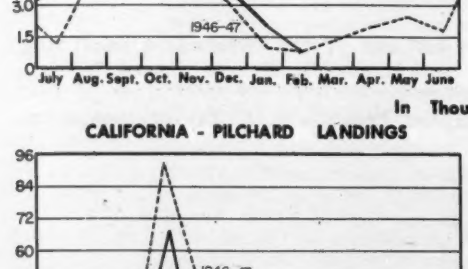


SEATTLE - RECEIPTS OF FRESH & FROZEN FISH
WHOLESALE MARKET , LANDINGS , & IMPORTS

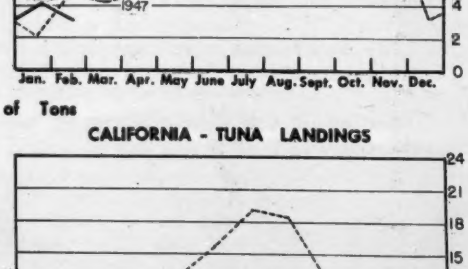


In Thousands of Tons

CALIFORNIA - PILCHARD LANDINGS



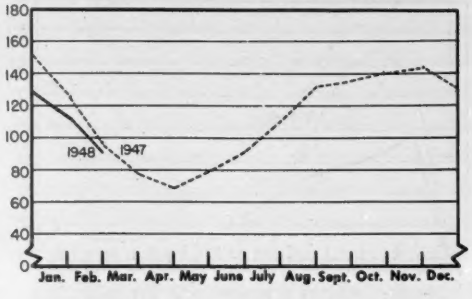
CALIFORNIA - TUNA LANDINGS



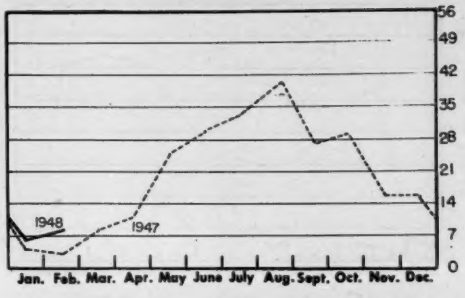
COLD STORAGE HOLDINGS and FREEZINGS of FISHERY PRODUCTS

In Millions of Pounds

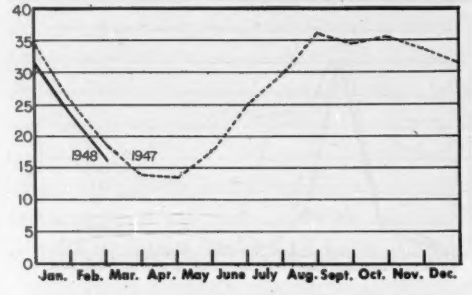
U.S. & ALASKA - HOLDINGS OF FROZEN FISH



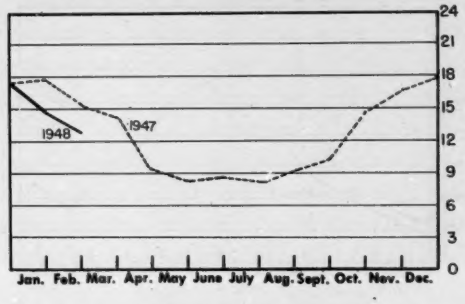
U.S. & ALASKA - FREEZINGS



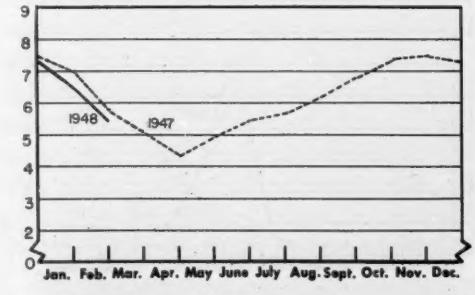
NEW ENGLAND - HOLDINGS OF FROZEN FISH



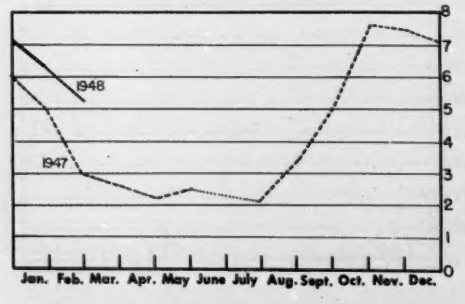
NEW YORK CITY - HOLDINGS OF FROZEN FISH



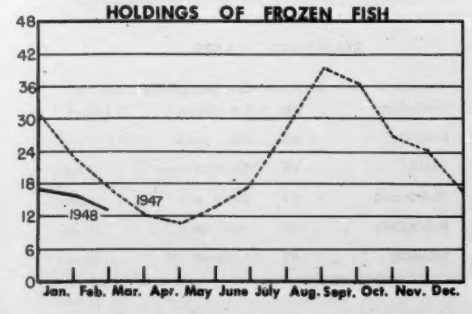
CHICAGO - HOLDINGS OF FROZEN FISH



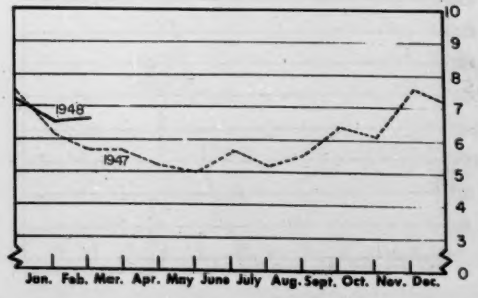
GULF - HOLDINGS OF FROZEN FISH



WASHINGTON, OREGON, AND ALASKA - HOLDINGS OF FROZEN FISH



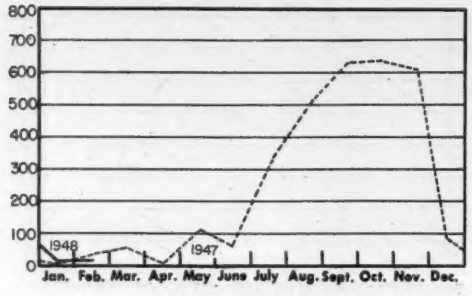
CALIFORNIA - HOLDINGS OF FROZEN FISH



CANNED FISHERY PRODUCTS

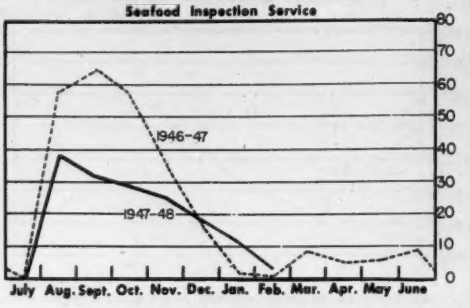
In Thousands of Standard Cases

MAINE - SARDINES, ESTIMATED PACK

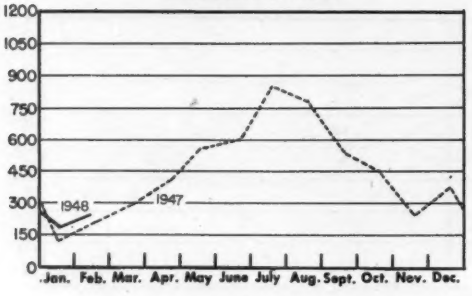


UNITED STATES - SHRIMP

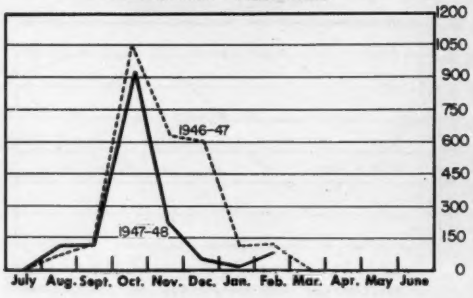
Plants under Food and Drug Administration Seafood Inspection Service



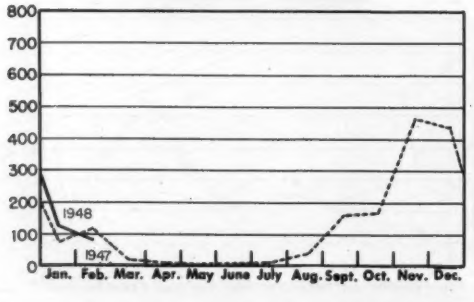
CALIFORNIA - TUNA



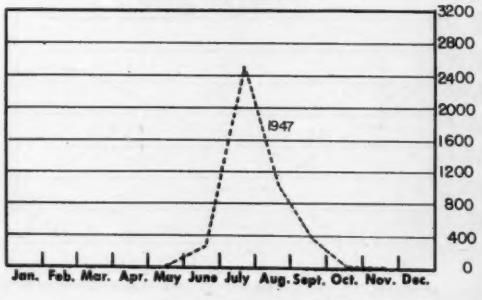
CALIFORNIA - PILCHARDS



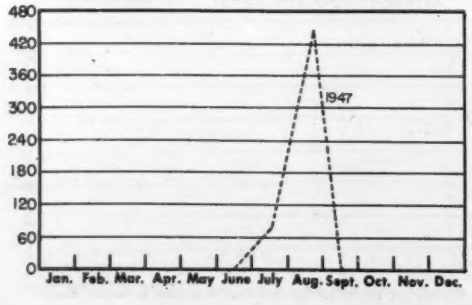
CALIFORNIA - MACKEREL



ALASKA - SALMON



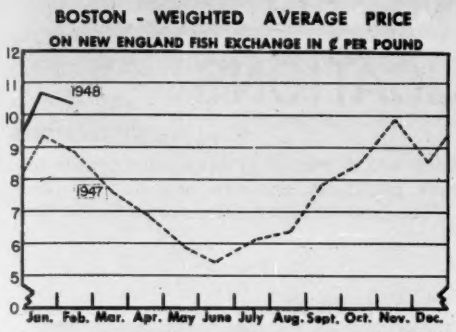
WASHINGTON - PUGET SOUND SALMON

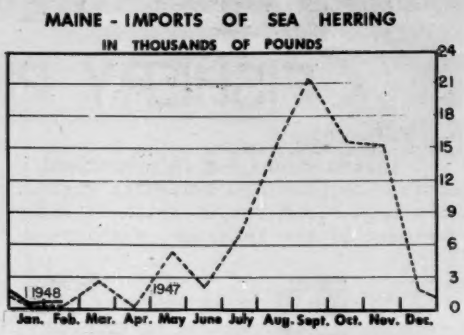


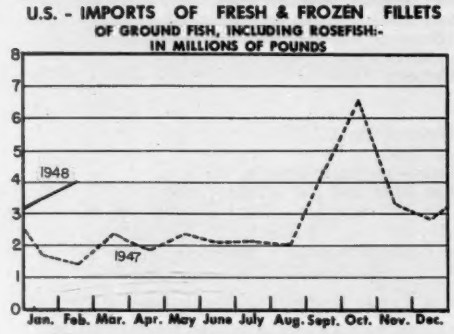
STANDARD CASES

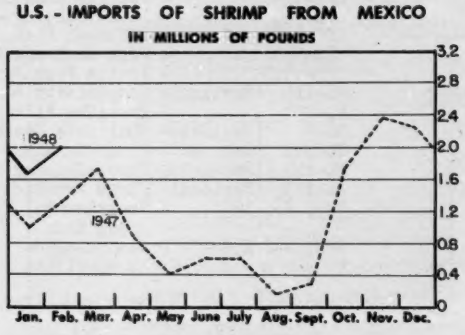
Variety	No. Cans	Can Designation	Net. Wgt.
SARDINES	100	1/4 drawn	3 1/4 oz.
SHRIMP	48	No.1 picnic	7 oz.
TUNA	48	No. 1/2 tuna	7 oz.
PILCHARDS	48	No. 1 oval	15 oz.
MACKEREL	48	No. 300	15 oz.
SALMON	48	1-pound tall	16 oz.

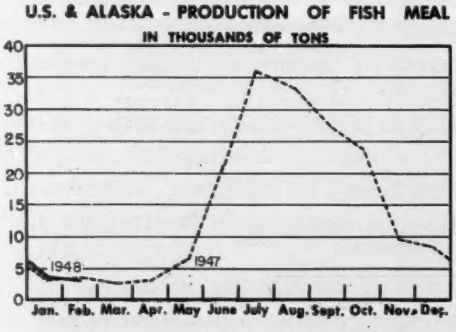
PRICES, IMPORTS and BY-PRODUCTS

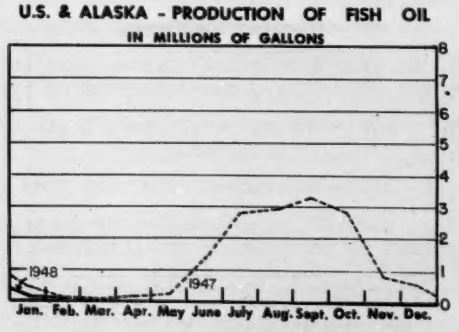

BOSTON - WEIGHTED AVERAGE PRICE
ON NEW ENGLAND FISH EXCHANGE IN ¢ PER POUND
1948
1947
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.

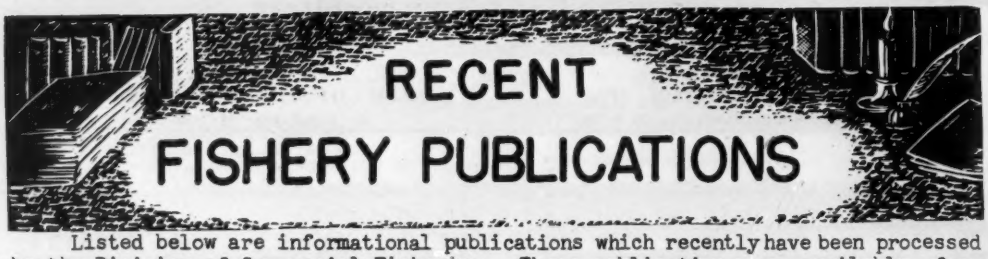



U.S. - IMPORTS OF FRESH & FROZEN FILLETS
OF GROUND FISH, INCLUDING ROSEFISH:-
IN MILLIONS OF POUNDS
1948
1947
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.









Listed below are informational publications which recently have been processed by the Division of Commercial Fisheries. These publications are available, free of charge, from the Division of Information, Fish and Wildlife Service, U. S. Department of the Interior, Washington 25, D. C.

Number		Title
CFS-383		- Fish Meal and Oil Report, November 1947
CFS-384		- Frozen Fish Report, January 1948
CFS-385		- Pacific Coast Fisheries, Annual Summary 1945
CFS-386		- Maine Landings, November 1947
CFS-388		- Packaged Fish, Annual Summary 1945
CFS-390		- Fish Meal and Oil, December 1947
CFS-392		- Frozen Fish Report, February 1948
FL-116	(Revised)	- Composition of Fish
FL-278		- Freezing Fish at Sea
SL-5	(Revised)	- Wholesale Dealers in Connecticut, 1947
SL-102	(Revised)	- Firms Canning Sardines, 1946
SL-110	(Revised)	- Firms Canning Oysters and Oyster Products, 1946
SL-153	(Revised)	- Firms Manufacturing Fish Glue and Isinglass, 1946
Sep. No. 195		- Experimental Fishing for Red Snapper - Part I--The Use of Hoop Nets
Sep. No. 196		- Technological Studies of the Starfish - Part II--Chemical Composition

Designations for fishery publications are interpreted as follows:

CFS - Current fishery statistics of the United States and Alaska.

FL - Fishery leaflets.

SL - Statistical lists, consisting of lists of dealers of fishery products and manufacturers of byproducts.

MDL - Market development lists of frozen food locker plants and locker associations.

Sep. - Separates (reprints) from Commercial Fisheries Review.

The following articles by personnel of the Fish and Wildlife Service have appeared in periodicals not published by the Government:

Oyster Free Liquor Content Depends Upon Cleaning Method, by Wm. B. Lanham, Rose G. Kerr, and S. R. Pottinger. Food Industries, March 1948. Vol. 20, p. 220-22, 332 and 334. (Copies of this article may be obtained free from the Fishery Technological Laboratory, Fish and Wildlife Service, Box 128, College Park, Maryland.)

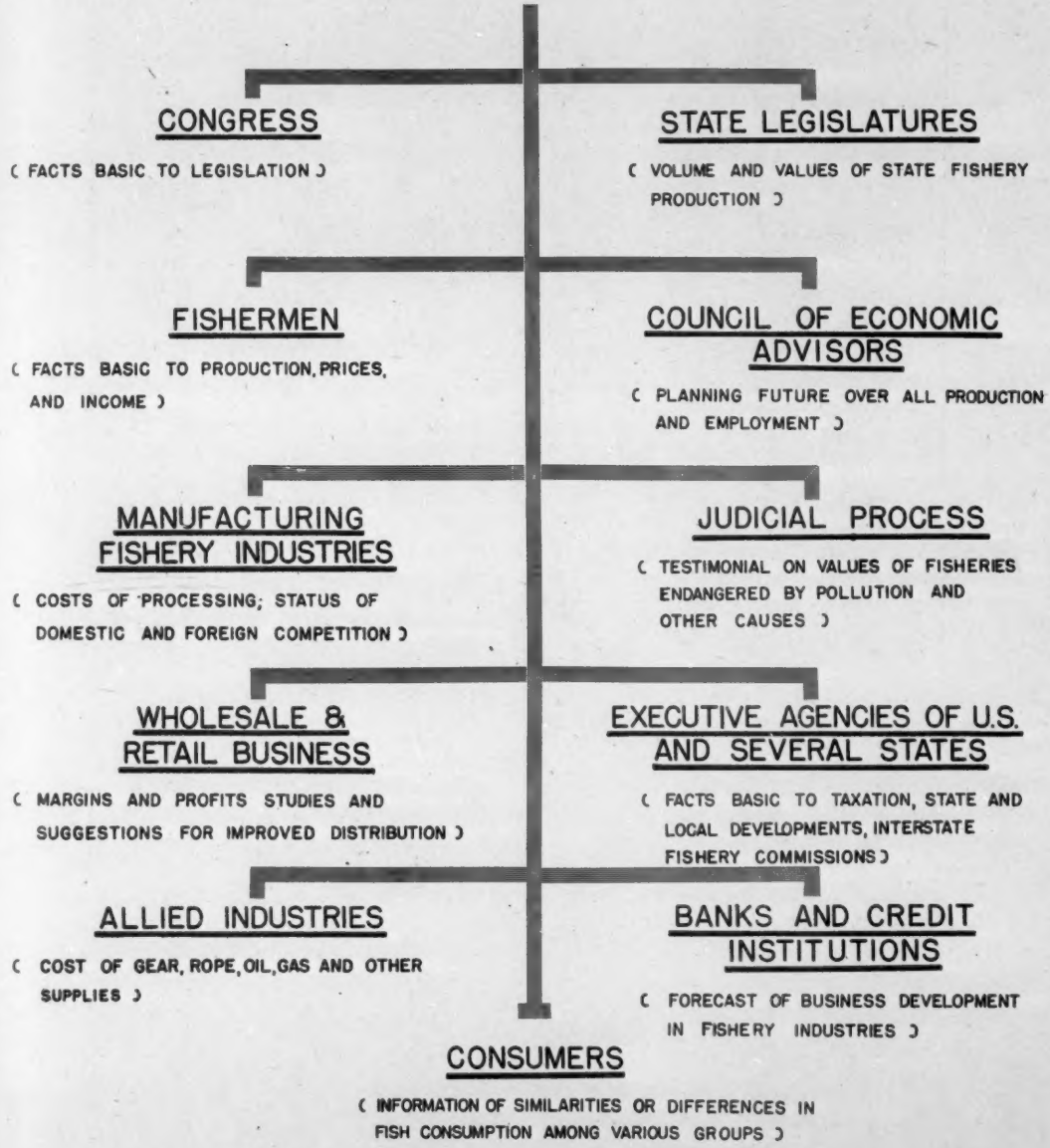
Maiden Voyage Proves Value of Mother Ship in Tuna Fishing, by Carl B. Carlson. Food Industries, January 1948. Vol. 20, pp. 43-46. (A limited number of copies of this article may be obtained from the Division of Commercial Fisheries, Fish and Wildlife Service, Washington 25, D. C.)

Processing -- Miscellaneous Service Division

Illustrator--Gustaf T. Sundstrom **Compositors -- Jean Zalevsky and Norma D. Loeffel**

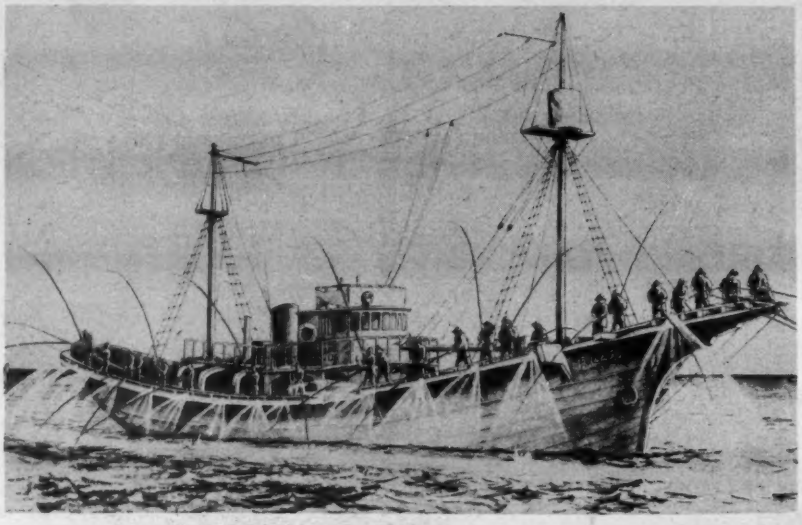
37054

FISHERY ECONOMIC RESEARCH ASSISTS


CONGRESS
(FACTS BASIC TO LEGISLATION)
STATE LEGISLATURES
(VOLUME AND VALUES OF STATE FISHERY PRODUCTION)
FISHERMEN
(FACTS BASIC TO PRODUCTION, PRICES, AND INCOME)
COUNCIL OF ECONOMIC ADVISORS
(PLANNING FUTURE OVER ALL PRODUCTION AND EMPLOYMENT)
MANUFACTURING FISHERY INDUSTRIES
(COSTS OF PROCESSING; STATUS OF DOMESTIC AND FOREIGN COMPETITION)
JUDICIAL PROCESS
(TESTIMONIAL ON VALUES OF FISHERIES ENDANGERED BY POLLUTION AND OTHER CAUSES)
WHOLESALE & RETAIL BUSINESS
(MARGINS AND PROFITS STUDIES AND SUGGESTIONS FOR IMPROVED DISTRIBUTION)
EXECUTIVE AGENCIES OF U.S. AND SEVERAL STATES
(FACTS BASIC TO TAXATION, STATE AND LOCAL DEVELOPMENTS, INTERSTATE FISHERY COMMISSIONS)
ALLIED INDUSTRIES
(COST OF GEAR, ROPE, OIL, GAS AND OTHER SUPPLIES)
BANKS AND CREDIT INSTITUTIONS
(FORECAST OF BUSINESS DEVELOPMENT IN FISHERY INDUSTRIES)
CONSUMERS
(INFORMATION OF SIMILARITIES OR DIFFERENCES IN FISH CONSUMPTION AMONG VARIOUS GROUPS)

U.S. FISH AND WILDLIFE SERVICE

THE JAPANESE TUNA FISHERIES



"The Japanese Tuna Fisheries," Fishery Leaflet 297, 60 pages, is a reproduction of Report No. 104 issued by the Natural Resources Section, General Headquarters, Supreme Commander for the Allied Powers, Tokyo, in March 1948.

Characteristics, distribution, migration, oceanographic data, habits, and economics of the leading commercially important species of tuna (black or bluefin, albacore, and yellowfin) are discussed in the leaflet. It also gives information on tuna fishing vessels, gear used, and the catch. The leaflet contains illustrations and tables of the Japanese tuna industry.

Fishery Leaflet 297 may be obtained upon request, without charge, from the Fish and Wildlife Service, Washington 25, D. C.

University of Michigan General Library,
Ann Arbor,
128D Michigan.

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILD LIFE SERVICE
WASHINGTON 25, D. C.

OFFICIAL BUSINESS
Permit No. 1015
Form MWa - 4/48 - 4,800

PENALTY FOR PRIVATE USE TO AVOID
PAYMENT OF POSTAGE, $300